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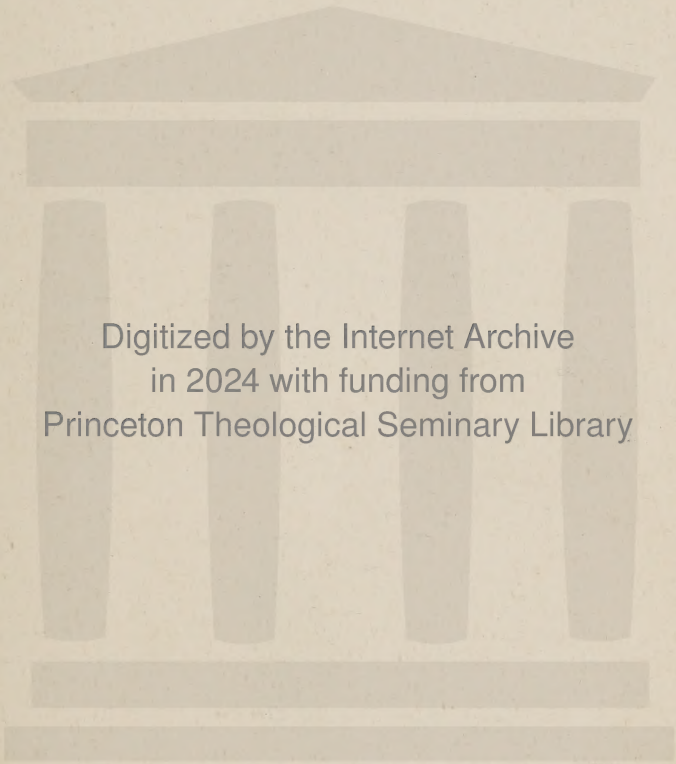
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Marginal Punched Cards in College and Research Libraries

by

Howard F. McGaw

The Scarecrow Press
Washington 7, D.C.
1952

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PREFACE

In view of the fact that the marginal punched card system was introduced to college and university librarians more than ten years ago (1), it is perhaps safe to assume that these members of the profession—certainly the ones who are gadget-minded—have by now heard something about it. Their knowledge, however, doubtless ranges all the way from a vague acquaintance with the term "punched cards" —in which case no distinction is likely to be drawn among the different types, whether marginal or otherwise—to the thorough familiarity with the system which comes from experience and study.

The objectives of this book are, first, to provide a guidebook to the librarian just beginning his exploration of the uses of marginal punched cards, and, second, to call to the attention of those who have been working with such cards, some of the techniques and applications about which they possibly have not heard.

The assistance of others has been gratefully received. Indebtedness to the following persons and organizations should be indicated specifically:

Robert L. Gregg, The McBee Company, Columbus, Ohio.

C. P. Keckley, The Charles R. Hadley Company, New York, N. Y.

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Wm. K. Walthers, Wm. K. Walthers Inc., Milwaukee, Wisconsin.

For convenience of reference the libraries to which acknowledgments are due are listed in Appendix I.

Finally, to Katharine M. Stokes, whose article, "A Li-

brarian Looks at Keysort," (2) has served to provoke so much of the current attention to marginal punched cards, the writer makes acknowledgment for his initial interest in this study. The material which he has gathered will serve one of its chief purposes if it helps to answer Miss Stokes's concern: that the marginal punched card routines which have been developed ". . . will be described from time to time so that other librarians trying to follow in the footsteps of their pioneering colleagues may have the guidance of the latest thought in setting up their own systems." (3)

FOOTNOTES

1. Kilgour, Frederick G. "A New Punched Card for Circulation Records." Library Journal 64: 131-33, Feb. 15, 1939.
2. Library Journal 72: 871+; 953+; June 1 and 15, 1947.
3. Ibid., p. 898.

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INTRODUCTION

In considering the variety of means whereby greater efficiency may be introduced into his institution, the college or university librarian may find it profitable to examine the marginal punched card system. This system, increasingly used by libraries, makes possible the rapid sorting of cards in terms of a considerable number of variables. Easily understood and simple to use, as far as the typical installation is concerned, it is a saver of time and energy, and has the added virtue of being relatively inexpensive.

Of the systems at all comparable to the marginal punched card system, the one most closely resembling it, yet so unlike it in many respects, is the more widely known machine-operated card system of IBM and Remington Rand. (1) These companies use a tabulating-size card (3 1/4 x 7 3/8 inches), over the center area of which is punched a pattern of holes representing particular data. As the cards are fed into the machines, the punched holes actuate the controls (through an electric contact in the case of IBM, and through a mechanical one in the case of Remington Rand), so that the cards may be sorted, selected, duplicated, etc., in the manner desired. In fact, this remarkable system—to borrow a line used in connection with even more elaborate machinery—can do practically everything except ". . . ask a student to take his feet off the table . . ." (2).

Unfortunately, most libraries cannot afford the IBM or Remington Rand equipment. What may be just the instrument for dealing with United States census material, or with the calculations of astronomers, or even with the library data of the larger universities, represents too much of an investment for the typical college library.

It is hoped that with perhaps greater use of the "mark sensed card," (3) and with more extensive utilization of IBM and Remington Rand service centers, (4) the present financial barrier to the use of such cards may be effectively reduced. (5)

Meanwhile—however much we should like to relegate all

of our routine tasks to the machine—our budgets will require, in most cases, that where we use a punched card system at all, we be content with the manually-operated type—"the poor man's IBM."

This is not to say, however, that the marginal punched card system possesses no advantages over the machine-type card system. Some of these advantages have already been indicated by Hoag and by Stokes, (6) as well as by others, and will be referred to, as occasion arises, throughout the rest of this book.

FOOTNOTES

1. The International Business Machines Corporation, 590 Madison Ave., New York 22, N. Y.; Remington Rand Inc., 315 Fourth Avenue, New York 10, N. Y.

2. "Less Perspiration, More Inspiration." Dartmouth College Library Bulletin 2: 150, May 1937.

3. A card which can be machine-punched automatically from marks made in the appropriate spaces of the card with a special pencil.

4. Offices to which cards may be sent for processing, at so much an hour for the use of the machines.

5. Ralph U. Blasingame has just completed (Spring, 1950) a master's thesis in the School of Library Service, Columbia University, on "The Application of International Business Machines in Libraries."

6. Hoag, Mary. "Indexing Union Contracts." Special Libraries 37: 106-10, April 1946; Stokes, Katharine M. "A Librarian Looks at Keysort." Library Journal 72: 871+; 953+; June 1 and 15, 1947.

CHAPTER I

"KEYSORT"

Basic Principle

When someone in the library's catalog department removes a card from the public catalog, another card, bearing a brief explanation for the removal, is usually substituted for the first. The second card, instead of having a hole punched at the center of the bottom edge like the first card, generally has an open slot or notch at this point, so that the card may be easily inserted over, or withdrawn from, the rod which locks the other cards in their places.

Let us suppose that there are half-a-dozen such substitute cards in a particular catalog drawer. If we should invert the drawer, all six of the notched cards, being unsupported, would fall out, while the remaining cards (punched but unnotched) would be securely held by the rod. This is, in its simplest form, the principle of the marginal punched card system. Its only "power" derives from the law of gravity.

Of course, the marginal punched card, as will be seen in many of the plates (Plate I, II, etc.), has not just one hole, but numerous holes, varying from a few along one edge of the card to as many as can be accommodated by all four margins of the card. Consequently it can be notched in a great variety of ways with a resultant elaboration of sorting possibilities.

Various trade names are associated with marginal punched cards, but there is essentially only one system, based on the principle described above. The cards and equipment of the several companies in the business are all characterized by comparatively low cost, simplicity, accuracy, flexibility, versatility, and speed.

Since the McBee Company (1) is the largest and most widely known of the marginal punched card manufacturers, and since most of the libraries which are being dealt with in this book use McBee "Keysort" equipment and supplies,

(2) the name and products of this company will serve as a point of departure in describing the marginal punched card system. Variant systems are described in Appendix III, reference being made to them in the body of the report only as occasion demands.

Background and Development

An interesting note on the history of marginal punched cards has been supplied by Ramsey. She reports that

> . . . although the first patent was issued in 1896, it was not until 1920 that the marginal punch card was used to practical advantage. . . (by a public health investigator) in Brazil. He experimented with cards upon which information was coded by cutting notches around the border by hand with scissors. For group separation these cards were placed against the sharp edge of a ruler which fitted into the notches and forced the unnotched cards to a higher level. The separation was then made by picking out the unnotched cards. (3)

This was certainly a crude beginning for the technique which today makes possible the slogan, ". . . the fastest sorting system in the world."(4)

The Perkins Patents

The McBee Company developed its marginal punched card system on the basis of the patents of Alfred Perkins, of England.(5) In his 1925 patent Perkins exhibits cards pre-punched along the edges with small, symmetrically-placed holes. A rod or wire can be easily passed through any given hole in a pack of such cards. Then, on the raising of the sorting instrument, any cards previously notched at the given hole will fall from the pack, the other cards remaining impaled. Thus a sorting takes place instantaneously.

Perkins points out that two kinds of notching systems may be employed. In the first, a given hole is assigned a specific significance. Two examples may be given, both relating to possible library uses. First, a given hole may

be labeled "R" and notched whenever the book named upon the card is on reserve. Second, a hole may be labeled "A" and notched whenever a given author's name begins with this letter. In all such cases "direct" coding is possible in the sense that the operator moves directly from an observed fact to notching the hole marked as corresponding to that fact. This is a simple operation, and in uses similar to that illustrated in the first example has no disadvantages.

But there are disadvantages in the case of the second example. Here twenty-six separate holes must be set aside, one for each letter of the alphabet, and even this arrangement does not permit the sorting of authors' surnames beyond the initial letter. Aware of this difficulty Perkins also provides for "indirect" coding. Under this system meanings can be arbitrarily assigned to a series of numbers and the coding of any of these provided for through the notching of one or more holes. By arranging the figures, 0 to 9, in one position on the card; then, just to the left, one or more similar "fields," as shown below, we may designate the first group as "units," the second group as "tens," and so on. Under this arrangement the num-

(Additional fields here as desired)	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0
	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9
	Tens	Units

bers 0 to 9 can be coded by the use of a single notch, 10 to 99 by the use of two notches, 100 to 999 by the use of three, etc. Thus by assigning the number 0 to all surnames falling between "Aa" and "Al," the number 1 to those from "Am" to "Aq," etc., a 100-division alphabetical code is made possible through the use of only 20 holes—as contrasted with a 26-division code requiring 26 holes in the "direct"-code illustration given above.

But even this arrangement was capable of improvement, as Perkins' 1929 patent reveals. Here it is shown that each field can be reduced from 10 to only 4 holes, as indicated below: (6)

(Additional fields here as desired)	0 0 0 0 7 4 2 1	0 0 0 0 7 4 2 1
	Tens	Units

The method of notching under this arrangement is as follows:

Number	Figures to be notched
0	None
1	1
2	2
3	2 & 1
4	4
5	4 & 1
6	4 & 2
7	7
8	7 & 1
9	7 & 2

The use of this system increases the average amount of notching that is called for but saves 60 per cent of the marginal card space, the latter becoming available for use in coding additional data. Eight holes will now provide for a 100-division alphabetical code of authors' surnames as contrasted with the 20 holes required by the former plan.

The series is arranged as 7-4-2-1 rather than as 1-2-4-7 in order to provide for a more convenient sequential sorting method. If it is desired to arrange a bunch of cards into numerical sequence, the sorting needle (see Plate II, p. 26) is passed through the No. 1 hole. When the needle is raised, all the 1's, 3's, 5's, and 8's—in whatever order they may be—will fall, since all are notched at the No. 1 hole, while the O's, 2's, 4's, 6's, 7's, and 9's will remain on the needle. All of the fallen cards are then placed at the back of the pack, and the needle is passed through the No. 2 hole. This operation will sort out the 2's, 3's, 6's, and 9's, since all of these numbers are notched at the No. 2 hole. The fallen cards are again placed at the back of

the pack, care being taken to pick them up in the same order, relative to each other, in which they dropped out of the pack. The arrangement of the cards is now as follows:

At the back: the 3's.
Next forward: the 2's, 6's, and 9's (mixed together).
Next forward: the 1's, 5's, and 8's (mixed together).
At the front: the 0's, 4's, and 7's (mixed together).

A third pass of the needle, this time through the No. 4 hole, will drop out the 4's, 5's, and 6's, and these cards are placed at the back of the pack. Now the arrangement of the cards is as follows:

At the back: the 3's, 4's, 5's, and 6's (in their proper order).
Next forward: the 2's and 9's (mixed together).
Next forward: the 1's and 8's (mixed together).
At the front: the 0's and 7's (mixed together).

The fourth and last pass of the needle, through the No. 7 hole, will drop out the 7's, 8's, and 9's, in that order. When these cards are placed at the back, the whole pack will be in exact numerical sequence from 0 to 9. (7) Not only, then, has Perkins effected a 60 per cent saving in card space, but a like percentage in sorting time.

The reader should understand that the above process requires a much longer time to explain than to carry out. The important thing to remember is that instead of having a pack of cards each with ten holes numbered 0 to 9 and requiring ten different "sorts" (i. e., separate passes of the needle to arrange in order), we can use only four holes and four sorts to accomplish the same purpose.

The A. L. A. Committee

Thanks especially to two committees, developments in the marginal punched card system have taken place at a more rapid rate than would have been the case without the study, encouragement, and publicity which these committees have made possible.

The American Library Association had, from 1944 to

1949, under its Committee on Library Equipment and Appliances, a Subcommittee to Study the Use of Punched Card Procedures in Libraries. (8) The subcommittee was discontinued, not because of the unimportance of its assignment, but—just the contrary—because the assignment had so increased in importance that most of the time of the parent committee was being devoted to it. (9)

The Committee on Library Equipment and Appliances has been chiefly concerned, however—as far as punched cards are involved—with the type used by IBM and Remington Rand. (10) Parker has indicated that "at no time did the committee give more than passing attention to marginally punched cards." (11)

Some of the regional associations have appointed committees which have been able to give more consideration to the marginal punched card, for instance, the Committee on Library Supplies and Equipment, of the Pacific Northwest Library Association.

The A. C. S. Committee

The other committee which has been referred to was set up in 1946 as the Punched Card Committee of the American Chemical Society. (12) Anyone familiar with the literature on the marginal punched card system will be aware of the great interest in, and use of, the system by chemists. It has been estimated that ". . . over 100 researchers are using McBee Keysort cards in the field of chemistry alone." (13)

The present chairman of the committee, James W. Perry, and another chemist, R. S. Casey, both of whose names have been prominent in the literature on marginal punched cards, have recently completed the editing of a volume scheduled for release by the Reinhold Publishing Company in the fall or winter of 1951, with the tentative title, Punched Cards—Their Application to Science and Industry. (14) The preparation of this book has been greatly facilitated by the existence of the Punched-Card Committee. It should be noted that the committee concerns itself with both the machine-operated and the manually-operated

types of punched cards; and both types are dealt with in the book edited by Perry and Casey.

One of the most significant contributions of the ACS Punched-Card Committee has appeared in the form of a "Bibliography on the Uses of Punched Cards."(15) Although most of the references are to the machine-type cards, the inclusion of marginal punched card literature seems to be fairly exhaustive.

The committees which have been mentioned will, it is hoped, continue to devote some of their study to marginal punched cards. Meanwhile they are serving an important need by focusing attention on some of the problems to be solved and by acting as clearing houses for the collection and dissemination of information concerning new techniques.

FOOTNOTES

1. Athens, Ohio; offices in principal cities.

2. Thirty-seven libraries out of forty-four; "Rocket" cards are used by the Sacramento Public Library, Texas College of Arts and Industries, and the University of Washington; "Cope-Chat" cards are used by the Nova Scotia Technical College; and a homemade marginal punched card system is used by the Hayward, Mill Valley, and Porterville public libraries. The new card adopted by Harvard College is not, strictly speaking, a marginal punched card.

3. Ramsey, Eva W. "Use of the Marginal Punch Card in Tabulating Vital Statistics Data." American Journal of Public Health 29: 907, August, 1939. The writer was unsuccessful in his attempt to secure further information, or references to sources, from Miss Ramsey. The type of card mentioned here is notched but unperforated, therefore the patent to which she refers probably bears no direct relationship to the Perkins' patents.

4. The McBee Co. McBee Keysort Manual. Athens, Ohio, The Co., c1942.

5. U. S. patents 1,544,172 of June 30, 1925; and 1,739,087 of Dec. 10, 1929.

6. Perkins' 1929 arrangement is actually slightly different from the one illustrated, which corresponds with what has now become standard practice. However, he had hit on the fundamental idea, and the subsequent changes have merely represented refinements.

7. The operation works out precisely as described only when a single 7-4-2-1 field has been employed. However, when additional fields—"tens," "hundreds," etc.—have been used, the sorting procedure if continued as described will result in the sequential arrangement desired, although what happens to the cards during the process will be more complicated than in the basic case described above.

8. This subcommittee superseded the Committee on Library Administration's Subcommittee to Study the Use of Tabulating Machines in Libraries, organized in 1937. (Maxfield, David K. "Library Punched Card Procedures: Past Experience and Future Possibilities." Library Journal 71: 905, 911, June 15, 1946.)

9. Letter, dated March 20, 1950, from Ralph H. Parker, Chairman, Committee on Library Equipment and Appliances.

10. The fact that so much of the punched card literature fails to distinguish between the manually-operated and the machine-operated systems makes for a confusing situation. It is hoped that, in the future, punched card systems will be referred to, especially on the part of the periodical indexes, in terms that will make the above distinction clear.

11. Parker (Letter) Op. cit. In this letter Parker states that "the work of the subcommittee is to be published (by the A.L.A.) in a book which will be titled Punched Card Applications in Libraries."

12. "The ACS Punched Card Committee; an Interim Report." Chemical and Engineering News 27: 754, March 14, 1949. (The name of this committee was changed in 1951 to Committee on Scientific Aids to Literature Searching.)

13. "Messrs. Casey, Bailey and Cox . . . before the Punched Card Committee of the American Chemical Society, January 13, 1947." Cited by Gull, C. D. "A Summary of Applications of Punched Cards as They Affect Special Libraries." Special Libraries 38: 208-9, September 1947.

14. Interview, Jan. 10, 1950, with James W. Perry; interview, Feb. 23, 1950, with G. G. Hawley, of Reinhold Publishing Co.; letter, dated July 2, 1951, from J. W. Perry.

15. Ferris, Lorna, Kanardy Taylor, and J. W. Perry, compilers. Journal of Documentation 3: 250-71, March 1948. See Bibliography for reference to second edition, which may be obtained from the Office of the Secretary, American Chemical Society, 1155 Sixteenth St., N.W., Washington 6, D. C., for 75 cents.

CHAPTER II

EQUIPMENT AND SUPPLIES FOR THE TYPICAL INSTALLATION(1)

The Hand-Slotting Punch

The McBee Company's(2) hand-slotting punch looks very much like the type used by train conductors. There are three different styles, to conform with the three different punching methods used on marginal punched cards: the shallow punch (the style shown in Plate I), for notching single-row holes; the deep punch, for notching double-row holes; and the center punch, for slotting the portion of the card which separates the inner hole from the outer one.(3)

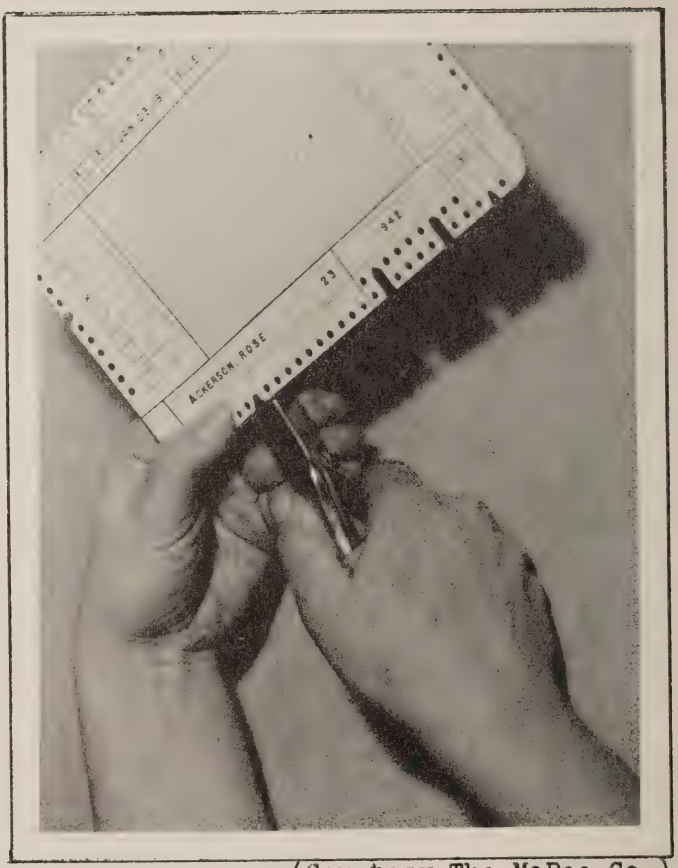
If the library uses cards which have both single and double rows of holes, the deep-punch slotter is generally used for both. This arrangement is much easier than shifting from the deep-punch to the shallow-punch slotter, or vice versa.

It is recommended that the library order one or two extra slotters beyond the number that will be required for regular use. The extra ones may then be used when the regular slotters have to be sent to the factory for periodic sharpening. (Several extra needles are also recommended, not because they get out of order, but because they may be put to effective use when large numbers of cards are to be sorted in a short period of time. One of the advantages of the marginal punched card system is that the work may be divided up and distributed to many hands.)

The Sorting Needle

The sorting needle, or "tumbler," which sells for $2.50, consists of a convenient four-and-a-half inch handle to which is mounted a semi-flexible steel shaft (see Plate II). The hole in the handle extends through its entire length, so that the needle may be adjusted by drawing it back into the handle or by pulling it out (the fully extended length is nine

PLATE I. The Hand-Slotting Punch



(Courtesy The McBee Co.)

and three-eighths inches, exclusive of the handle.) A nut at the forward end of the handle is tightened to set the needle at whatever length is convenient for use at a particular time.

If, in the interest of economy, homemade devices are preferred, a knitting needle seems to be the favorite instrument. Young recommends ". . . a steel 12-inch No. 2 knitting needle. . . ."(4) The lack of a handle, other than the small knob at the end, seems not to be a particular handicap.(5)

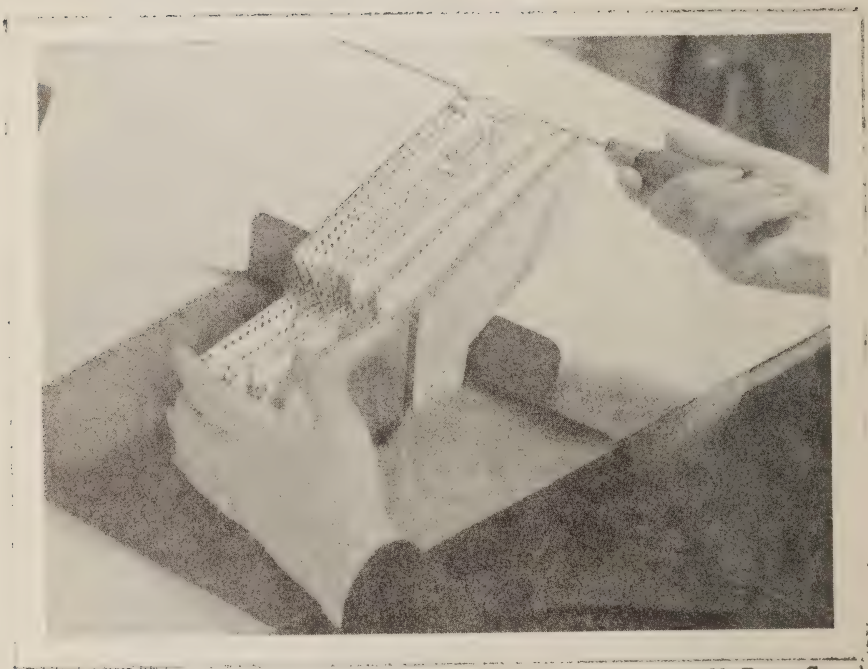
Pinkus thinks his efforts at economy, through the use of homemade needles, were wasted. He reports the saving of $7.15 by having three tumblers made from a pair of steel knitting needles costing seventeen-and-a-half cents each. But he ". . . learned that was a poor economy, since the steel in the knitting needles was too flexible to give satisfactory results."(6)

In sorting, beginning operators are cautioned to keep the needle parallel with the top of the table. Tipping the needle forward will result, of course, in some of the cards' falling off at the point, which is especially inconvenient when doing final sorting for serial arrangement—the type of sorting described on pages 18-19. On the other hand, if the needle is tilted upward, the friction produced by the pressure of the outer cards against the inner ones, prevents the notched cards from falling.

For efficient sorting, the McBee Company recommends that the operator sit at a table twenty-seven inches high.(7) Though sorting for brief periods may be done practically anywhere—even standing up—the recommended height should be kept in mind where hundreds of thousands of cards must be handled. (The standard desk height is about thirty inches.)

Two techniques, indispensable to efficient sorting, should be described in connection with the needle. One of these techniques provides the answer to the problem confronted by an operator when he attempts to sort a large number of tightly packed cards. After the passing through, and the lifting up, of the sorting needle, many of the notched cards do not fall because of the friction between them and the

PLATE II. The Tumbler and Alignment Block



(Courtesy The McBee Co.)

contiguous cards. The obvious way of overcoming this problem is to manually spread the cards over a greater length of the needle. But this method, aside from being slow and clumsy, does not insure, without tedious effort, uniformity of spacing.

Fortunately, a simple trick was hit upon. If, after inserting the needle into the pack of cards, the handle is then moved to the left, the right and left edges of the cards will become beveled. While the thumb and fingers of the left hand, grasping the left end of the pack, exert a little pressure to maintain the bevel, the handle of the needle is returned to its original position. The effect of this operation is to spread the cards along the needle in an approximately even-spaced, fan-like arrangement—an arrangement which permits the unhindered dropping out of the notched cards. (With the left hand still in position, the bottom of the pack of cards is knocked sharply against the sorting table, an upward movement of the needle being made simultaneously with the release of the left hand.) An inexperienced operator is usually rather awkward with this technique, but skill is achieved with only a little practice.

The second of the techniques which has been mentioned, grew out of the first. Obviously the card edges may be beveled by moving the handle of the needle either to the left or to the right. The former direction, however, seems to produce the easier combination of arm, hand, and finger positions. In any event, the operator will prefer to stick to one direction or the other, and for purposes of this illustration it will be assumed that he fans the cards in the manner described.

The question now is how to make efficient sorts when the holes are to the far left side of the card—a situation which places the operator's two hands in such proximity that they not only impede the movements of each other, but by virtue of their both being at one end of the card, throw out of balance the weight distribution of the pack.

The solution to this difficulty lies in the simple expedient of turning the cards around, so that the needle is inserted from the back instead of from the front. The new position of the cards will also mean that the sequential sorting di-

rection will be reversed: the needle now moves from left to right along the row of holes instead of from right to left as in the standard procedure; and the fallen cards are now placed in the front of the file instead of at the back.

When sorting along the short side of a rectangular-sized card, the reversal of the direction is unnecessary because the fanning arrangement is achieved, not by moving the handle of the needle to the side, but by pushing it straight down. This movement bevels the cards so that those in the back are lifted off the table, permitting the insertion, underneath them, of the operator's left-hand fingers. The rest of the procedure is similar to that given in the previous illustration.

The Alignment Block

The alignment block (Plate II, p. 26) is an angle iron consisting of a flat piece of steel, on the bottom of which is cemented a piece of rubber to prevent the iron from slipping on the table. A flange hangs over the front edge of the table as an anchor, and another flange, extending upward, forms the right border of the iron. As the name implies, the iron is used for aligning the marginal punched cards. Forcing the pack of cards against the right flange after the notched cards have begun to drop, is a further aid in the sorting process. (The price of the alignment block is $2.00.)

In the absence of an alignment block, and where "highly polished tables or glass surfaces" are being used, the Hadley Company recommends the use of desk blotters "to overcome the tendency of cards to slide."(8)

"Card Savers"

Correction strips, or "card savers," are short, pre-gummed and pre-perforated lengths of tough paper used for the correction of mistakes made while notching. They are also used when a decision has been made to change the coding of one or more sections on cards some of which have already been notched according to the superseded code. And they are often used, as will be seen in Chapter

IV, in connection with the re-notching of cards representing overdue books. Although conventional mending tape may be used for the above purposes, this method does not compare with the use of stickers made by the marginal punched card companies.

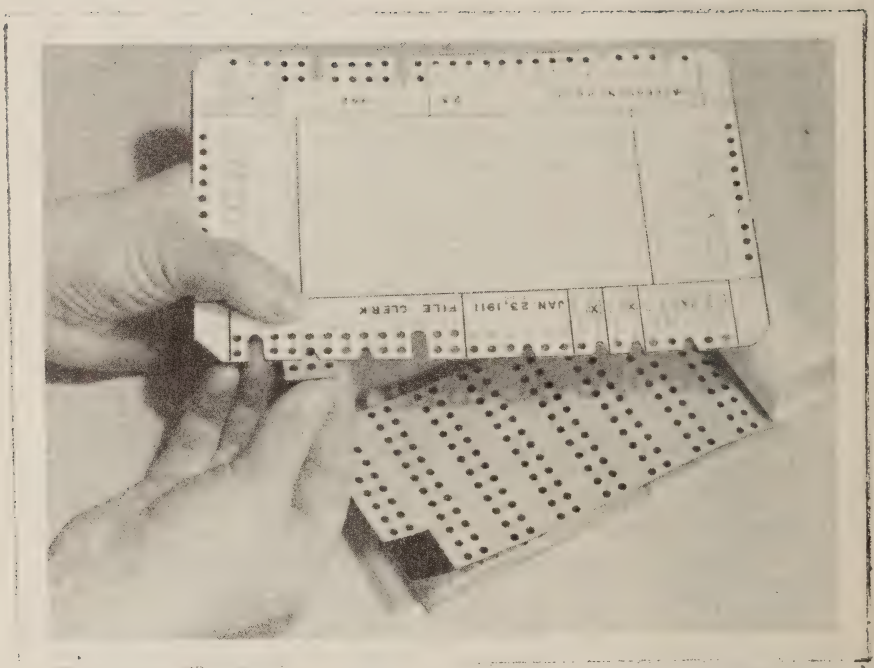
The card savers come in little books (selling for twenty-five cents each) from which the strips are conveniently torn out as needed. Two styles are available, for use, respectively, with outer- and inner-row holes. Each single-row unit consists of a strip bearing six holes, three of which fit over one side of the card, and three over the other, with the middle hole over the "mistake" (see Plate III). The unwanted notch is thus bridged and the card salvaged. If more than one hole has been punched mistakenly, two or more units of the card savers are used. For cards employing a double row of holes the card savers consist of units bearing twelve holes each.

Since the use of card savers is not mentioned by Kilgour,(9) it may be assumed that either such aids were not available when his article appeared, or, if available, he did not use them. Be that as it may, librarians may sometimes have occasion to employ Kilgour's device for canceling a notch in a particular card. The cancellation is accomplished simply by stapling to the original card a second "Keysort" card. (Some librarians may want to employ this trick as a means of salvaging used cards.) It does not matter how many times the second card has been notched, just as long as there is an unnotched hole in the position corresponding to the one which needs canceling.

Where there is little likelihood that card savers will be used, it is recommended that the tab, formed by the notching of adjacent holes, be clipped off. Otherwise the tab will sometimes catch into the holes or over the edges of other cards, interfering with the sorting process. On the other hand, tabs should not be clipped off until the cards have been checked for possible mistakes, since tabless cards are more difficult to correct than the ones which still bear these projections.

Stokes has commented on the difference of treatment required by marginal punched cards and cards of the machine

PLATE III. "Card Savers"



(Courtesy The McBee Co.)

type.(10) Whereas the cards used by IBM and Remington Rand must be handled carefully, and cannot be salvaged if damaged, marginal punched cards can take all kinds of punishment. ". . . even if they are folded, wrinkled, crumpled and torn, the efficiency or speed of sorting or tabulating is in no way hindered. Grease spots, dampness or soiled surfaces likewise have no effect on Keysort."(11)

The Cards

Size

Marginal punched cards are available in almost any practical size. The manufacturers usually refer to a range in size from 2 x 3 1/2 inches to 7 1/2 x 8 1/2 inches, but larger cards may be ordered if needed. The largest card which has come to the writer's attention is one used by a clothing manufacturer in Birmingham, Alabama—a card measuring 11 1/2 x 13 1/2 inches.(12) The largest card, to the writer's knowledge, used by a library, is one which measures 8 1/2 x 10 1/2 inches, used by the Personnel Office of the New York Public Library.(13) Only two libraries seem to have used a card smaller in size than the traditional 3 x 5 inches. (13-A)

The Hadley Company, after stating the usual size ranges, says that "larger cards can be employed when maximum sorting speed is not essential,"(14) indicating the direct relationship between size of card, beyond certain limits, and the ease and speed with which the cards may be manipulated.

Ramsey reports changing from a 4 x 6-inch card to one of standard tabulating size, 3 1/4 x 7 1/2, a size which she found ". . . considerably easier to handle."(15)

Stokes has mentioned the economy of using a card 3 1/4 inches wide rather than one which is 3 inches wide, since the former dimension represents one of the standard widths to which the company's manufacturing equipment is adjusted.(16) According to Stokes, the difference in cost between 3 x 5-inch cards and 3 1/4 x 5-inch cards is sufficient to justify the library's changing the dimensions of its charging trays to conform to the larger card.(17)

Many libraries will be especially interested in the fact that the Committee on Library Supplies and Equipment of the Pacific Northwest Library Association has been successful in persuading the Charles R. Hadley Company ". . . that a sufficient market exists to justify printing a standard form card in the 3 x 5 size used by libraries."(18) (See Plate IV).

While economy is always one consideration, the library must be chiefly guided, in its choice of the proper card size, by the over-all requirements of the particular situation. An initial economy may be more than offset by other factors, including, of course, the economy of day-to-day maintenance.

Pinkus recognized, too late, that he had made too great a sacrifice for the sake of "economy." He used for his particular purpose a 5 x 8 card, "which was the size available in the Supply Division, instead of a 3 1/4 x 6 card, which was the size I needed. This made the handling much more cumbersome, and increased the time spent in slotting and sorting the cards."(19)

Cost

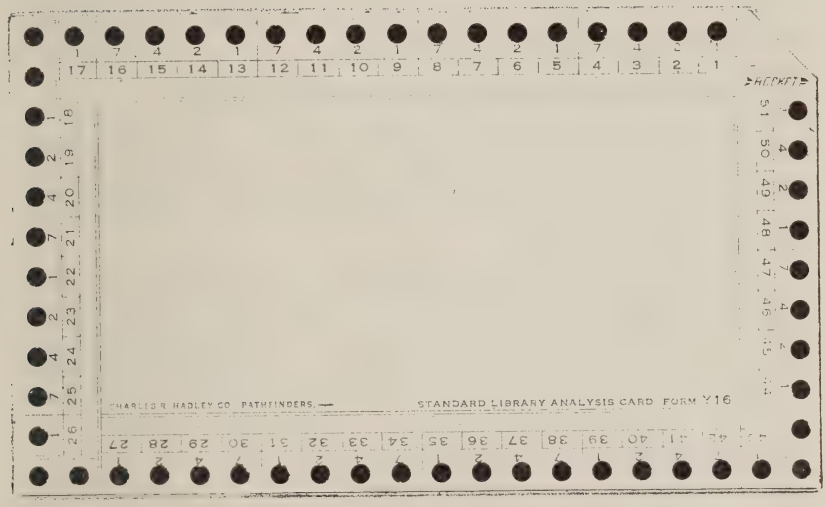
The cost of the cards will naturally vary in proportion to the size of card used and the quantity ordered. Kilgour reports that the cost of his "Keysort" cards, ". . . including the charge for the wax plates from which they are printed, is approximately three times that of the printed cards formerly used."(20)

The American University spent approximately $500.00 on its ". . . initial supply of cards and tools . . . ," and "the cards will be used up before the end of the year."(21)

Pinkus reports a price of $3.91 per thousand, in 100,000 lots, of 50 per cent rag-stock "Keysort" cards 3 1/4 x 6 inches—a price, he says, "which compares very favorably with the price of ordinary printed cards of the same size."(22)

The McBee Company has recently discontinued its 50 per cent rag-content card, confining its card stock to a card of 25 per cent rag content (suitable for most library uses);

PLATE IV. The "Rocket" Standard Library Analysis Card



one of 100 per cent rag content (rarely used); and a sulphite card. The cost of the 25 per cent rag-content card, in lots of 100,000, is $3.99 per thousand for the original order, which includes the cost of the electro-plate, and $3.67 per thousand for succeeding orders.(23)

Several economies, in card ordering, may be mentioned. If it is desired to have some of the cards of a different color from the others, where the color would be the only difference, an eighth-inch strip of the wanted color may be applied by the manufacturer to one or more margins of the cards, thereby saving some of the expense that would be required in ordering a separate color printing.

Sometimes it is found desirable to alter the center portion of a card without changing the marginal pattern. In this case the manufacturer can substitute a second design for the original center without charging for a completely new electro-plate.

After the librarian has definitely decided on the particular total design which he wishes to use, it is very important for him to check carefully with the representative of the marginal punched card company to see that the design which is to be duplicated by the electro-plate process is, in every detail, the one desired. If the librarian accepts, as satisfactory, the representative's rough draft, and the job gets beyond the electro-plate stage, expensive alterations in the proof may become necessary—alterations which might have been avoided had a minutely detailed drawing been furnished to begin with. Since the cost of plate alterations can be so high—as high, indeed, as the cost of making an entirely new plate—the librarian should request that the representative furnish either an exact copy of what the finished product will look like, or a larger sketch drawn to scale.

Design

The librarian may want to keep some of the following considerations in mind as the card is being designed. (Incidentally, some of the recommendations made by Lloyd-Jones and Smith,(24) and by others, concerning card forms,

apply equally well to marginal punched cards.)

"Corner sorting"—One corner of the card is usually clipped off, in a diagonal cut, so that the operator may be easily reminded when all the cards in the pack are right-side up and facing the same direction (see Plate VIII, p. 130; the cards used at present by libraries do not have the rounded corners shown on the cards in Plates I-IV). The cut-off corner is most often the one at the upper right, but need not necessarily be. Any of the other three corners may be used for this purpose, or, if desired for special reasons, all four corners may be kept intact.

The corner holes are generally not used in the sorting process. Besides being more difficult to use than the other holes, they serve a more useful purpose in being reserved for "corner sorting." In a particular pack of cards, some of the cards may be wrong-side up and others may be facing the wrong direction. For purposes of illustrating how this condition is to be remedied,(25) let us suppose that the clipped corners of the properly-arranged cards are at the top right. A needle is inserted through the top right hole of the pack. This operation will impale all of the improperly arranged cards but none of the properly arranged ones. The impaled cards are lifted up and in a semi-circle to the left, finally being placed so that the hole through which the needle has passed, is at the bottom left. This technique will properly arrange all of the cards which are facing the operator. The remaining cards, if any, which continue to show an intact instead of a clipped corner at the upper right, represent cards which face the wrong direction. They are removed with the needle, then turned over, and arranged in the same manner as has been described, so that they will conform with the pattern of the other cards.

A variation of the 7-4-2-1 labeling—Ordinarily the same combination, 7-4-2-1, is printed in each field, with "U" or "units," "T" or "tens," "H" or "hundreds," etc., indicated as the case may be. However, where no digit higher than the hundreds is used, it may be desirable to print 70-40-20-10 in the tens field and 700-400-200-100 in the hundreds field.(26) Mistakes made in notching are probably

less common under the latter system than under the conventional one.

Extra holes—Not many users of marginal punched cards provide for extra holes, to be used for purposes which are unanticipated at the time the system is put into effect. If the coding space is quite limited for the particular assignment for which the card is designed, and if there is not much likelihood that other uses of the card will need to be made, it may be desirable to exploit the full capacity of the card from the beginning. But if there is any doubt about the possibility of incorporating further classifications, several extra holes, properly numbered for the eventuality of either direct or sequence sorting, had better be included. One recommendation is to set off ten per cent of the positions for unassigned uses.(27)

Double rows of holes—One advantage of the double row of holes is that, while the inner row requires little additional card space, it does not interfere at all, until it is notched, with the use of the outer row; and if the independent use of each row is of sufficient importance, the inner row may be "center punched"—an operation that will be explained in Chapter III.

Placement of codes—If the top edge of the card is to be coded at all, and if the cards are to be ordinarily maintained in a particular order designated by code, it is desirable that this code be at the top. The pattern of grooves will then conveniently indicate to the assistant that the cards are correctly filed. For instance, all of the cards bearing the number 72 will be notched at the "7" hole in the tens field and at the "2" hole in the units field. Should a card bearing any other number, say 41, be mistakenly filed with the 72's, the error is caught when the operator notes the break in the "72" groove pattern. If the filing pattern of the entire pack of cards, instead of being at the top, is along the side or at the bottom, convenient detection of filing errors is not possible.

On many cards there are one or more little boxes which a person is asked to check in order to indicate, say, his college status, or whether he is doing assigned or unassigned reading, etc. Whenever possible, if direct coding of

this information is used, the box should be placed adjacent to the hole which will code the particular information (as shown on the card in Plate I, p. 24). The cards used by the registrar's office at Fordham University's City Hall Division are an excellent example of this type. After a student has checked the appropriate boxes, it is an easy job for an untrained assistant to notch the corresponding holes. The simplicity of this arrangement at Fordham is undoubtedly responsible, in large measure, for the continued use of, and satisfaction with, the system over the past fifteen years.(28)

The writer is acquainted with one setup where the students were asked to fill out a questionnaire, and the information thus obtained was then transferred by office help to marginal punched cards. Since the questionnaire was long and the number of students large, the work involved in the transcribing process required an enormous amount of clerical time and energy—so much, indeed, that the marginal punched card system itself received an undue proportion of criticism. If arrangements had been made for the students to check the answers directly onto cards specifically designed for this purpose, most of the tedious work entailed in the installation of the system, and the consequent discouragement, might have been avoided.

Stock Forms

If the librarian prefers to experiment with the use of marginal punched cards in a particular department before deciding on a special design, he should inquire about the stock forms available. These offer the advantage of comparatively low cost, since they are mass-produced, and the convenience of being readily available. Another advantage is that they may be ordered in quantities of 2,000 or more, whereas specially designed cards are generally supplied only on orders of 10,000 or more. It may turn out that a stock card will serve so well the requirements of a department, that the use of such a card is continued indefinitely.

The "Keysort" stock cards of most general applicability are forms No. KS371B and No. KS581B. Both have single

rows of holes around all four sides, and contain no printing except the coding, which is of such a pattern that the cards may be adapted to a wide variety of uses. (Except for the difference in size, and, therefore, in coding capacity, the "Keysort" cards described here are identical with the "Rocket" card, Form Y-16, shown on Plate IV, p. 33.) Form KS371B is 3 1/4 x 7 1/2 inches in size and contains 76 holes besides the three corner holes. Seventy-three of the holes are numbered for direct coding: 27 each along the top and bottom; 10 on the left and 9 on the right. For sequence sorting, both top and bottom rows provide 6 3/4 complete fields of the 7-4-2-1 combination; the left side 2 1/2 such fields; and the right side 2 1/4.

Form KS581B is 5 x 8 inches in size and is exactly like the other card except for having greater coding capacity. This card contains 94 holes besides the corner holes. For direct coding, 29 positions are available at the top and a like number below; plus 17 on the left and 16 on the right. The sequence coding consists of 7 1/4 fields each at the top and bottom, 4 1/4 on the left, and 4 on the right.

Use of Center Area

One of the advantages of the marginal punched card is that the center area may contain hand-written or typed material—an advantage of very limited application to the machine-type cards. Since the stock cards are completely blank except for the numbers around the edges, they are especially suitable for bibliographic and other reference work, where the data to be coded may be written directly onto the front, and if necessary, the back of the card. This center space also permits the mounting of clippings and other material, as is described on pages 163-64

Master-Code Cards

If the coding pattern of the stock card is not suitable for a particular use, the "master code" (a pattern card to which reference is made when coding or decoding is being done) may ignore the stock-form coding and indicate one of an entirely different type (for instance, the triangular type

of coding described in Chapter III).

Whether the stock-card coding is used or not, a master code of some kind will be necessary. It may appear on a card similar to the one which is being coded, or on one similar in original size but from which one or more rows of holes have been cut off so that, for purposes of convenient coding or decoding, it may be superimposed on the file card. A third arrangement, used in some quarters, and suggested to the writer by Keckley,(29) may be used when the operator wishes to refer to the written data in the center area of the card at the same time that he consults his code. This method involves the formation of the master code around the outside of the card to be coded. In other words the center area of the master code is cut out, the size of the cut-out section corresponding to the dimensions of the file card. If the master card is mounted on cardboard or plywood, the file card can be recessed into the master-code frame and conveniently marked for notching (or for the determination of needle positions if the card is being decoded).

Printing and Mimeographing

In connection with the printing or mimeographing of information (whether of codes or not) on stock cards, the following experiences will be cited.

Kirkpatrick, as well as others, has purchased blank cards from one of the marginal punched card companies, and has had the printing done by a local printer.(30)

Pinkus reports unsatisfactory results from his attempts to mimeograph data onto the cards,(31) but Cox, Casey, and Bailey indicate that ". . . on-the-card forms can be mimeographed with perfect register even between the double holes for purposes where only a few hundred cards are needed."(32)

Homemade Cards

Librarians whose budgets are quite restricted may want to examine Young's description of a setup in which he manufactured his own marginal punched cards.(33) Young men-

tions the fact that since the Perkins patent, on which the "Keysort" system is based, ". . . is now in the public domain, anyone may adapt it to suit his needs."(34)

Changes in the Original Design

Before leaving this section of the report, it may be well to give reassurance to those librarians who have found it necessary to modify the design of their cards. Although careful initial planning will usually obviate the necessity for making alterations in the card as originally designed, some things cannot be easily anticipated, and are brought to light only after the system has been in actual use over a period of time. The essential point is that the card be used efficiently for its particular purpose, and if greater efficiency can be introduced by changing the original plans, the librarian should not hesitate to change them. The most experienced workers with marginal punched cards often find it necessary to modify the design of a card which originally was regarded as quite satisfactory.(35) In some cases it may be more economical in the long run to change to an entirely new card.

The equipment and supplies indicated thus far—hand slotter, tumbler, alignment block, cards, and card savers —are all that are essential in most installations. The alignment block and the card savers may be omitted, if necessary, but they constitute very inexpensive and useful aids in the efficient operation of the system. The fact that so little equipment is necessary; the fact that its cost is so low; and the fact that maintenance expenses are practically nonexistent except for the re-orders for cards (since there is hardly anything about the equipment to get out of order) —these facts make it possible for even the smallest library to afford the marginal punched card system.

FOOTNOTES

1. Types of equipment and supplies not required in the typical installation are described in Appendix II.
2. The present chapter will be devoted principally to the equipment and supplies of the McBee Co. The products of

the other marginal punched card manufacturers will be dealt with in Appendix III.

3. These punches are priced at $3.00, $3.50, and $4.00, respectively. (Unless otherwise indicated, the prices mentioned in this chapter are based on information supplied by the New York office of the McBee Co., on April 11, 1950.) The notch-type punch is available from, or can be ordered through, most stationers', but it is doubtful if any saving can be effected over the marginal punched card manufacturer's price.

4. Young, George G. "Borrower Merely Signs His Name." Library Journal 74: 15, Jan. 1, 1949. For other recommendations, see p. 182.

5. Letter, dated Jan. 24, 1950, from Virginia Robinson, Mill Valley (Calif.) Public Library.

6. Pinkus, Philip J. "Mechanical Preparation of Age Progress Report." High Points 30: 33, May 1948.

7. The McBee Co. McBee Keysort Manual. Athens, Ohio, The Co., c1942.

8. The Charles R. Hadley Co. Sorting Alphabetically and Numerically with Rocket. Los Angeles, The Co., n. d.

9. Kilgour, Frederick. "A New Punched Card for Circulation Records." Library Journal 64: 131-33, Feb. 15, 1939.

10. Stokes, Katharine M. "A Librarian Looks at Keysort". Library Journal 72: 898, June 1, 1947.

11. The McBee Co. McBee Keysort. Athens, Ohio, The Co., c1943.

12. An "E-Z Sort" card.

13. A "Keysort" card.

13-A. The Harvard College Library formerly used a card measuring 3 1/4 x 3 3/4 inches. In the spring semester of 1951 the Circulation Department of the University of Houston Library adopted a "Keysort" call card of these dimensions. By ordering one-hundred-thousand 3 1/4 x 7 1/2-inch cards, the library spent relatively less per square inch of card area than would have been the case had it ordered 3 1/4 x 5-inch cards; and by having the 7 1/2-inch card cut across the middle (so that the delivered stock actually consisted of two-hundred-thousand 3 1/4 x 3 3/4-inch cards), the library reduced the total cost fifty per cent. (A further economy, as far as coding capacity is concerned, was effected by using the new 5-holes-to-the-inch card now being produced by the McBee Co.'s automatic machinery.)

14. The Hadley Co. Sorting Alphabetically . . . Op. cit.

15. Ramsey, Eva W. "Use of the Marginal Punch Card in

Tabulating Vital Statistics Data." American Journal of Public Health 29: 908, August 1939.

16. Stokes, Op. cit., p. 899. "Economy" lengths, available in the 3 1/4-inch width, are 5 inches, 6 inches, and 7 1/2 inches.

17. Stokes. Loc. cit.

18. Pacific Northwest Library Association. "Library Supplies and Equipment." (Committee Report). PNLA Quarterly 14: 43, October 1949; "Committee on Library Supplies and Equipment." (Report). PNLA Quarterly 14: 82, January 1950. Several other references to this card will be made. See especially p. 154.

19. Pinkus. Op. cit., p. 33.

20. Kilgour. Op. cit., pp. 131-32.

21. Letter, dated March 8, 1950, from Anne Jensen.

22. Pinkus. Loc. cit.

23. Information from Patricia R. Sherman, of the McBee Co., New York office, April 11, 1950.

24. Lloyd-Jones, Esther McD., and Margaret Ruth Smith. A Student Personnel Program for Higher Education. New York, McGraw-Hill Book Co., 1938, pp. 274-76.

25. In this illustration we are assuming a conventional, rectangular-shaped card. For square-shaped cards a slightly different technique is employed.

26. The lack of printing space would prevent the carrying out of this arrangement in the fields beyond the hundreds.

27. The Findex Co. Findex Classification Manual. Milwaukee, The Co., 1929, p. 24.

28. Interview, Feb. 15, 1950, with William F. McAloon, Assistant Registrar.

29. Interview, Feb. 28, 1950, with Carl P. Keckley, of the Charles R. Hadley Co. (New York office).

30. Kirkpatrick, A. F. "An Application of Punch Cards; Filing of Optical Properties of Crystals." Analytical Chemistry 20: 848, September 1949.

31. Pinkus. Op. cit., p. 33.

32. Cox, Gerald J., Robert S. Casey, and C. F. Bailey. "Recent Developments in Keysort Cards." Journal of Chemical Education 24: 67, February 1947.

33. Young. Op. cit., pp. 12+.

34. Ibid., p. 14.

35. Krieger, K. A. "A Punched-Card System for Chemical Literature." Journal of Chemical Education 26: 164, March 1949; U. S. War Dept. "Operation of Marginal Punched Card Sorting System." Section IX of its Person-

nel Classification. (Technical Manual TM12-425, June 17, 1944) Washington, D. C., U. S. Government Printing Office, 1944, p. 58; Cox, Gerald J., C. F. Bailey, and Robert S. Casey. "Punch Cards for a Chemical Bibliography." Chemical and Engineering News 23: 1625, Sept. 25, 1945; Ramsey. Op. cit., p. 908.

CHAPTER III

CODING AND SORTING METHODS

The librarian who decides to use the marginal punched card system naturally wants to get the most out of it. This section on coding and sorting will acquaint him with a wide variety of methods from which he may choose those which are most readily adaptable to his particular needs. While the techniques described are applicable to many fields besides librarianship, the writer has, he believes, included none which is (at least theoretically) unusable in library practice.

Conventional Coding and Sorting of Cards with Single-Row Holes

Direct Coding and Sorting

First, consideration will be given to marginal punched cards which contain but a single row of holes. The double-row procedures, it is felt, will be better understood if treatment is deferred until descriptions of the single-row procedures have been made clear.

The simplest and fastest sorting is accomplished through the use of direct coding. In this case, a particular hole is assigned to a single classification, say, books on reserve. This hole is labeled "R" or "Res.," or is given a number, and every marginal punched card representing a reserve book is notched at this hole. Here we have a file of, say, 3,000 cards, in which there are only two classes of books: those on reserve (say, 500) and those which are "regular" (2,500). We take from the file about 300 cards (the number generally recommended as the largest number which can be conveniently handled at one time in this kind of sorting) and pass the needle through the "R" hole. All the reserve-book cards in the pack fall out, and are put aside. All cards remaining on the needle represent regular books. The latter cards are removed from the needle and put aside in another pile. The operation is repeated till all

3,000 cards have been sorted into the two piles. With only a few hours' practice, the operator can perform this whole process in about three minutes, or at the rate of 1,000 cards per minute.

It is in the characteristic of the system whereby large numbers of cards fall from the needle at the same time, that such great sorting speed lies. The McBee Company claims that "Keysort is the only sorting system in the world in which the cards are not individually sorted."(1) As if the 60,000 per hour rate were not enough, it is further claimed that experienced operators can sort up to 90,000 cards per hour.(2) This is 66,000 cards per hour faster than the rate of the IBM electric sorter, which operates at the rate of 400 cards per minute.(3)

Returning to the illustration dealing with reserve-book cards, we see that it is possible to separate these cards from all the other cards with only one pass of the needle (that is, up to the capacity of the needle). Wherever such a separation can be made, there we shall find an example of direct coding.

In the case cited, it matters little whether we want to withdraw all the reserve-book cards or all the regular cards. In the end, they are all neatly divided, in two separate piles, with only one pass of the needle. For such a situation, then, one hole only is necessary—not two.

This application can be made wherever a given file consists of only two classifications; for instance, male or female, student or faculty member, etc. Only one hole is needed. If the two classes are about evenly divided in number it does not matter whether the hole bears the label of one or the other. But if, as in the case of the reserve books, we have only some 500 cards, as contrasted with the 2,500 cards for regular books, it obviously would be wasteful of time and effort to punch each of the larger number of cards when we could achieve the same result by punching the smaller number.

Semi-direct Coding and Sorting

A modification of direct coding may be seen in the fol-

lowing illustration. The World Trade Department of the San Francisco Chamber of Commerce uses a card(4) on which there is a single-hole code (direct sort) for North America, and 10 separate holes for direct coding of particular sections of North America. This means that every time one of these sections is coded, two holes are notched, one for the section and one for North America. Such an arrangement provides for the dropping out of all the North America cards in one operation by passing the needle through the hole labeled North America; or for dropping out the cards of any one of the 10 separate sections of the continent by needling that particular hole.

To conserve card space, a more involved system is used by this organization in coding sections of Europe and Asia. Each of the latter two continents is represented by direct coding, and there are 23 holes to represent sub-areas. As in the North America arrangement, if all the Asia cards are wanted, they can be dropped out with one pass of the needle; and likewise with all the Europe cards. But the similarity of the two arrangements ends at this point. For if the cards representing, say, Siam, are desired, not only must the Siam hole be needled, but also the Asia hole, because the same hole that is used for Siam in the code for the Asiatic countries is also used to designate Norway in the code for the European countries.

Another variation of direct coding is found in the employment, by Cox, of two holes to represent four classifications.(5) A hole labeled No. 17 is used to represent the eighteenth century, hole No. 18 represents the nineteenth century, and "no punch" represents the twentieth century (all—so far—orthodox examples of direct coding). But Cox applies the semi-direct principle in notching both holes, 17 and 18, to indicate any date falling in the period preceding the eighteenth century. Here, incidentally, we have an excellent illustration of economy in coding. The largest number of Cox's references falling in the twentieth century, he omits the punch for this classification; and he has to notch (and sort) twice for only the comparatively rare references to pre-eighteenth century literature.

Still another pattern of coding, of the semi-direct type,

is seen in the arrangement on some cards for indicating the days of the month (Fig. 1).

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17

Fig. 1.—Combination of direct and semi-direct coding for the days of the month, using 16 positions.

Any one of the first 16 days of the month is indicated by notching the hole bearing the desired number. The days represented by the 17th through the 31st, however, require two notches, one for "16" and the other for the desired date. In the above code the numbers are conveniently arranged so that each of the figures in the top row, plus 16, adds up to its paired number in the bottom row. The sorting technique, however, is simply adapted to such convenience, and may be adapted with equal facility to other arbitrarily selected codes. For instance, if we decide to reverse the order of the bottom row of numbers, placing No. 17 under 15, and No. 31 under 1, we would then select No. 17 by needling holes 15 and 16. That the sum of the latter two numbers does not equal 17, would not make the slightest bit of difference to the holes or to the needle.

The same principle, extended from the 2-row to the 3-row arrangement, is found in Figure 2. Any of the dates from the 1st through the 10th may be selected by direct sort. To select a date in the second row, the position "R2" (for Row 2) must be notched along with the one for the desired number; selection of a third-row number is made in a corresponding manner. The alphabetic code (Fig. 3) follows the same pattern.

0	0	0	0	0	0	0	0	0	0	0	0
R	R	10	9	8	7	6	5	4	3	2	1
3	2	20	19	18	17	16	15	14	13	12	11
		30/31	29	28	27	26	25	24	23	22	21

Fig. 2.—Combination of direct and semi-direct coding for the days of the month, using 12 positions.

0	0	0	0	0	0	0	0	0	0
R	R	H	G	F	E	D	C	B	A
3	2	P	O	N	M	L	K	J	I
		XYZ	W	V	U	T	S	R	Q

Fig. 3.—Combination of direct and semi-direct coding for the alphabet, using 10 positions.

There is nothing except the limited printing space at the margin to prevent the extension of this same technique to four or more rows. The handicap, of course, is a reduction, with each added row, of the number of holes that can be direct-sorted with only one pass of the needle.

Indirect Coding and Sorting

Although direct and semi-direct coding and sorting are much simpler and faster than the indirect approach, it is necessary to turn to the latter method if we wish to record on the card more information than can be accommodated along the marginal area by the one-to-one or by the one-to-two classification-to-hole relationship.

Indirect coding usually employs a scheme of numerical sequence. From an earlier illustration (pp. 18-19) the reader will recall that the pattern commonly used on marginal punched cards consists of the series 7-4-2-1, each such series constituting a field to represent units, tens, hundreds, etc., the number of fields depending upon the range of numbers to be coded.

The difference in coding capacity between direct coding and numerical, or indirect, coding may be seen by the following comparison. There can be just enough holes along one edge of a 7 1/2-inch card for the direct coding of 26 separate items. With a change to indirect coding, however, employing the identical number of holes, "... it is possible to code 3,999,999 positive and non-conflicting numerical classifications. When all four edges of a Keysort card are used, the numerical classifications available extend into almost fabulous figures."(6)

It must be understood, of course, that if we use the card referred to above, with only one edge coded, 3,999,999 sep-

arate cards would be required to code that many classifications. In other words, only one number may be punched into a given "section"(7) of the same card. The card may be designed to carry a dozen or more sections, in which case a dozen or more numbers may be coded on the same card; but only one number to each section.

It was shown earlier that in direct sorting, one group of cards could be separated from another at the rate of 1,000 per minute. This is still true in indirect sorting. If we needle the No. 1 hole, all the cards notched at this hole will drop, and all the cards unnotched at this hole will remain on the needle. The cards have thus been segregated into two groups with the same technique and with the same speed. The big difference is this: not only do the No. 1 cards drop, but also the No. 3's, the No. 5's, and the No. 8's, since the three latter numbers are formed by combining No. 1 with Nos. 2, 4, and 7, respectively. In order to sort out the 1's, we would have to needle the No. 7 hole to eliminate the 8's, needle the No. 4 hole to eliminate the 5's, and needle the No. 2 hole to eliminate the 3's.

Indirect coding is not designed for speedy selection of a given category of cards. This need is taken care of by direct coding. Indirect coding is designed principally for speed in sequence sorting—the arrangement of all of a given group of cards in serial order. The system permits the performance of this task at the rate of 6,000 to 9,000 cards per hour.(8)

A brief description of sequence sorting has already been given.(9) Since it is essential that the fallen cards be kept in their original order, with respect to one another, the operator can conveniently handle only about half as many cards (about 150) as he can manipulate in direct sorting.(10)

The process of sorting from right to left is usually referred to as "fine" or "final" sorting, as distinguished from "rough," "breakdown," or "preliminary" sorting. Rough sorting is always necessary when the total number of cards to be sorted is larger than can be handled by the needle at one time. In other words, for sequence sorting, groups of cards larger than 150 in number must first be broken down, at the rate of about 300 cards per operation,

into piles of the smaller size. If we have a large group of cards representing various numbers in the sequence 1 to 99, we would first needle the No. 7 hole in the tens field to drop out all the 70's, 80's, and 90's. These are put aside and the No. 4 hole in the tens field would then be needled to drop out the 40's, 50's, and 60's; and so on. At the end of this series of operations the first group of cards, i. e., the 70's, 80's, and 90's, is broken down into its constituent tens' divisions by needling the No. 2 hole to drop out the 90's and by needling the No. 1 hole to drop out the 80's. As soon as we have a group, say, the 90's, which contains no more than approximately 150 cards, we may change to "reverse" or final sorting, needling from right to left instead of from left to right. With four passes of the needle, through holes 1, 2, 4, and 7, respectively, of the units field, the whole group is arranged in perfect order. In case the 70's, 80's, and 90's, all together, should include no more than 150 cards, final sorting may be introduced at this point without the necessity for making a further breakdown. In this case the needling of holes 1 and 2, respectively, in the tens field would be done after, rather than before, the needling of the holes in the units field.

Thousands of cards can be sorted in this manner, the operator never having on his table, at any one time, more than ten separate piles—a condition ". . . which makes it a simple matter to keep the job well organized."(11)

The fact that a group of like-punched cards exhibits the same groove pattern is a means whereby different groups may be easily distinguished from each other. If a few cards notched "47" should get mixed up with a group of cards notched "74," the contrast in the positions of the grooves would be apparent at once. It is the series of grooves along the edge of a pack of similarly punched cards, providing a pattern resembling the Yale-type key, which identifies a particular classification—the pattern belonging to this classification and to no other, just as the key is notched to fit only one lock.(12)

The librarian who spends much time at his files will soon be able to identify particular cards by their characteristic notching patterns, without reference to a master code. But

if he is dealing with a large number of classifications, such as a 999-division alphabet, it will be necessary for him to use an off-the-card code, i. e., a code contained on a card or other record separate from the file card itself. The convenience of having the label immediately under the hole, as in direct coding, has to be sacrificed in the interest of increased coding capacity.

Where the code is too lengthy and/or complicated to be memorized, and where a considerable amount of reference to the code is necessary, it is recommended that visible-index equipment be installed, convenient to the area where cards must be coded and decoded.(13) In addition to making the code instantly accessible, this equipment permits the code to be ". . . added to continually and kept in alphabetical (or any other) order without constant re-typing."(14)

Since consideration has already been given to the 7-4-2-1 field for sequence sorting, this may be an appropriate place to indicate that the same four numbers can provide not just 9 different classifications, but 14. Instead of stopping with the combination 7 and 2, we go on to code the numeral "10" from Nos. 7, 2, and 1; "11" from 7 and 4; "12" from 7, 4, and 1; "13" from 7, 4, and 2; and "14" by notching all four of the numbers. This arrangement, it must be added, complicates the selecting process, for now when the No. 1 hole is needled, not only—in addition to the 1's—do the 3's, 5's, and 8's drop out, but also the 10's, 12's, and 14's. Happily, however, sequence sorting is not affected. Four passes of the needle will arrange the cards in exact order from 1 to 14.

This additional coding capacity may be exploited in the case of single fields, or, if there are several, of the last field to the left.(15) For instance, if there are only two fields, the potential coding capacity is not 99, but 149. If there are 5 fields, the capacity is not 99,999, but 149,999.

To obtain an even larger number of classifications from 5, 6, or 7 holes, using the 7-4-2-1 series, the following device may be employed. Instead of considering the second field on the left as that of the tens digit, we would use the particular code number in this field to represent a series. The difference in coding capacity will be seen in

Figure 4. A 1 1/2-field or 6-hole section, with a capacity under the tens-units system of 30, is shown to have a capacity, under the series and sub-class arrangement, of 56. In other words there is the difference between 30 + 9 and 4 x 14. (In regard to the column, "Tens field as series," the multiplications are by 2, 4, and 8, respectively, rather then by 1, 3, and 7, since the units field alone constitutes series No. 1.)

Number of 7-4-2-1 fields	Capacity		Tens field as series	Units field as sub-class	Capacity
	Tens	Units			
1	0	14	0	14	14
1 1/4	1	9	1	14	28
1 1/2	3	9	3	14	56
1 3/4	7	9	7	14	112

Fig. 4.—Comparison of coding capacities of digit arrangement and series arrangement.

With reference to the above figure, if we proceed to the next step by providing a full 2-field section, the capacity under the tens and units arrangement again becomes equal to that of the series arrangement (149), and the advantage of the latter system would then be canceled.

This technique may be used, if desired, with any number of fields. A section of 5 fields, the left-most of which uses the 4-2-1 combination, has a capacity, with conventional coding, of 79,999. Under the series arrangement this capacity can be increased to 119,992 (8 x 14,999).

Before leaving the subject of indirect coding, it may be well to mention the desirability of designing one's marginal punched card for both direct and indirect coding of the same holes. For instance, if 12 holes are available, they may be marked off into the three conventional fields for numerical coding, and also numbered from 1 to 12 for direct coding. No matter which coding is used, the other coding is usually not in the way, and it may be very useful,

providing an opportunity for the employment of two fields for direct coding and the third for indirect, or for other combinations the need for which cannot always be anticipated.

A simple, but rarely seen, example of the combination of direct and indirect coding is found on the Order Card of the University of Illinois Library. The arrangement is shown in Figure 5. The section is designed for indicating the agent from whom books are ordered. Numerical coding is used for miscellaneous agents (the agent's name presumably being coded by a 99-division alphabet), and direct coding is used for "principal agents." The hole labeled "P" is notched to designate the use of the direct code, and must be needled along with the appropriate hole. With this kind of arrangement it is necessary to remove the cards for all of the principal agents before the cards for miscellaneous agents can be separately sorted. And it is also necessary to remove at least certain ones of the principal-agent cards before cards representing particular miscellaneous agents can be effectively selected. The fact that all principal-agent cards can be dropped out with one pass of the needle through the "P" hole, greatly simplifies the above-mentioned operations.

0	0 0 0 0	0 0 0 0
P	7 4 2 1	7 4 2 1
	8 7 6 5	4 3 2 1

Fig. 5.—Combination of direct and indirect coding applied to the same positions.

Selective Coding and Sorting

If we have a pack of several hundred cards, numbered with indirect coding from 1 to 99, and we desire to drop out all those that bear the number "48," the routine would be as follows: the No. 4 hole in the tens field would be needled, and the 40's, 50's, and 60's would fall; the No. 2 hole of the fallen cards would then be needled, and the 60's would fall, leaving the 40's and 50's on the needle; a needling of the

No. 1 hole would drop the 50's, leaving the 40's. We now have not only all of the 48's that were in the pack, but also all of the 41's, 42's, 43's, etc. If now the No. 7 hole in the units field is needled, the 47's, 48's, and 49's drop out. Needling the No. 1 hole at last produces the 48's.

This process requires less time to perform than to describe, but is, nevertheless, not a rapid way of selecting a given group of cards. As has been indicated earlier, the numerical code is not designed for fast selection, but for fast sequence-sorting.

But there is, fortunately, a method of combining the advantages of indirect coding and sorting, with direct sorting, permitting efficient selection of a given classification, rapid arrangement of the cards in serial order, and large coding capacity.

The cards used in the recent illustration (selecting the "48's") were coded by using the conventional series of 4 holes, 7-4-2-1. To this series the selective-coding method adds two holes labeled "SF" and "O." The selection of a given number is accomplished by using two needles simultaneously according to the code shown in Figure 6. The "SF" stands for "single figure," and a hole with this label is notched, as indicated below, whenever the number to be selected is a single figure, i. e., a 7, 4, 2, or 1.(16) It is not punched when the number to be selected is represented

Number to be selected	Code
0	0
1	SF & 1
2	SF & 2
3	2 & 1
4	SF & 4
5	4 & 1
6	4 & 2
7	SF & 7
8	7 & 1
9	7 & 2

Fig. 6.—Code used for selective sorting.

by a combination such as 2 and 1, 4 and 1, etc.

Suppose, now, that it is desired to select all of the No. 48 cards from a pack of several hundred, assuming that the selective code has been used. The technique would be quite simple. Taking a convenient handful of cards, say, 150, we would insert 4 different needles as indicated in Figure 7.(17) With this arrangement of the needles, all the 48's, and only the 48's, will drop out.

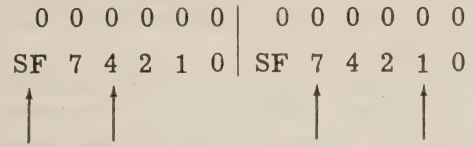


Fig. 7.—Arrangement of needles for selectively sorting the number "48" in a 2-field section.

It has already been mentioned that in selective sorting, 2 needles are used in each field (except in the case of the zero). In this manner the extraneous cards which would have fallen had only a single needle been used, are locked off by the second needle, and thus prevented from falling.

The fact that "SF" stands for single figure will serve to remind the operator to notch this hole at the appropriate times. The use of the "O" position, however, generally causes some difficulty. In conventional sequence coding, the zero is ignored; but in selective coding it is notched whenever it appears as a digit. Otherwise, when the operator attempts to select, say, only the 70's, he will also get the 71's, 72's, 73's, etc. Or if he is selecting "509," he will get the correct hundreds and units digits, but he will get all of the cards in the tens field which have "5" in their hundreds field.

The second use of the "O" position may be illustrated in the following example: We have a 2-field selective-coded section, and it is desired to select the cards bearing the number "3." It will be shown that the punching of the zero in the tens field will have been necessary before we can accomplish this. If, in a 2-field section, all of the 3's, are not punched as if they were "03's," an attempted se-

lection of this number would drop out not only all of the 3's but also all of the 13's, 23's, 33's, 43's, etc. Notching the zero in the tens field makes it possible to lock off these unwanted cards.

This same principle applies whenever more than one field is used. If the number to be coded consists of fewer digits than the number of fields in the section, all of the fields to the left of the given number's highest digit must be locked off by the notching of zeros in the extra fields. Thus in a 5-field selective-coded section, the number "76" must be coded "00076."

In weighing the advantages of selective coding, some sacrifices must be taken into account. More notching is required and more coding space is needed than in conventional sequence coding. The sequence sorting procedure, however, remains the same. Needling, in turn, only the 1, 2, 4, and 7 positions will arrange selectively-coded cards in serial order. The "SF" and "O" holes are used only in the selective process, for locking-off purposes only, and are not needed in sequence sorting.

Now that the reader has been introduced to selective coding, let us take a further step—one that, if described before this point, would undoubtedly have been confusing.

In the series 0, 1, 2, 3, etc., the "O" is sometimes used as a part of a code, not only as a units digit, but simply as a lone cipher. In this case the SF-7-4-2-1-0 combination in the units field will provide for such use; the zero may be selectively sorted with one pass of the needle. This use, however, is not common. The principal function of the "O" hole, as was shown above, is to indicate the zero digit of a multiple-digit number, and to lock off fields where digits are not wanted.

Since the cipher as an individual figure is rarely used, we find that it is possible to save one hole, in selective coding, by using one less "O" than we have fields. For instance a 2-field selective code might be arranged as in Figure 8. The zero is here used to serve both fields. If we want to code any of the numbers from 1 to 9, we notch such a number in the usual manner (along with "SF" where necessary). In addition, the zero is notched to lock off the

0 0 0 0 0	0	0 0 0 0 0
SF 7 4 2 1	0	SF 7 4 2 1

Fig. 8.—Use of a single "O" for a 2-field section in selective coding.

tens field. It is also notched whenever it appears as the units digit of a 2-digit number, in order to lock off the units field. The "O" position, then, in selective coding, may be used one less time than the number of fields in the section.

Incidentally, the location of the "O" holes on the card depends altogether on punching and sorting convenience. The holes may all be grouped together at one end of the section, or distributed among the fields, as desired.

Variations of Conventional Coding and Sorting

For the most part, the procedures which have been considered thus far represent the more or less conventional coding and sorting methods. A few of the less frequently used techniques (single-row holes with double- or triple-row labeling; the use of series numbers to expand coding capacity; etc.) were introduced because they seemed to fit in more appropriately with the other material. Our attention may now be turned to a consideration of some of the various ways in which conventional coding and sorting have been modified to meet particular demands.

If we are numerically coding the states of the union, we would probably assign No. 1 to Alabama and No. 48 to Wyoming, an arrangement quite satisfactory for many purposes. However, if frequently we need to review the cards for all the states in a particular region, it would be wasteful to have to sort out, separately, each of the member states. One way of solving this problem would be to provide a separate hole for each region, notching the region position each time that we notch the hole for a state within this region—a system involving direct and semi-direct coding of class and sub-class. (It will be recalled that this is the system described earlier in connection with the

coding of countries of North America, Europe, and Asia.)

The same result can be achieved, without, to be sure, some of the advantages of direct sorting, but in a much more restricted coding area, by employing a modification of numerical coding, and a grouping arrangement. Instead of assigning numbers in serial order to the alphabetized list of states, we could assign tens digits to the regions and units digits to the states, making it possible to drop out all of the cards for the New England states, for example, by needling, say, the 40's. An individual state may still be sorted out, as under the alphabetically-assigned arrangement, by needling the particular code number for that state. For instance, if Connecticut, as one of the New England states, is No. 41, all cards referring to this state may be dropped out by needling this number, while the cards for Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont, which have been assigned Nos. 42-46, respectively, remain undisturbed.

It is obvious that this system may be employed wherever sub-classes and classes are in the proportion of about ten to one. If there are less than this number of sub-classes, part of the sub-class code may be unassigned, or two or more classes assigned to the same tens digit. If there are too many sub-classes to be accommodated by a single tens digit, two or more such digits may be used.

A simple, but clever, system of classification, using the sub-grouping technique, is shown in the illustration which follows. Suppose we are coding the ages of a group of people. The need for referring to the cards of all those who are within certain age groups is likely to be much greater than the need to identify those people who were born in one particular year. This being the case, "a method of classifying which is based upon the divisions and sub-divisions of the numeral 16 is suggested."(18) The age groups would be coded as shown in Figure 9. (In the lower portion of the figure the codes are indicated in parentheses.) If we want to drop out the cards of the people 49 years of age and over, a needling of position No. 4 would accomplish this purpose. Needling the combination 3 and 5 would sort out the 33 to 40 age group. Needling 2, 6, and 7 would give the

Grand Divisions	Code
Age	
16 and under	1
17-32	2
33-48	3
49-64 (and over)	4
First sub-division	
First half	5
Second half	6
Second sub-division	
First quarter	7
Second quarter	8
Third sub-division	
First eighth	9
Second eighth	10

Major Groups		First Half (5)				Second Half (6)			
		First Q. (7)		Second Q. (8)		First Q. (7)		Second Q. (8)	
		First 8th (9)	Second 8th (10)	First 8th (9)	Second 8th (10)	First 8th (9)	Second 8th (10)	First 8th (9)	Second 8th (10)
Under 16	(1)	1-2	3-4	5-6	7-8	9-10	11-12	13-14	15-16
17-32	(2)	17-18	19-20	21-22	23-24	25-26	27-28	29-30	31-32
33-48	(3)	33-34	35-36	37-38	39-40	41-42	43-44	45-46	47-48
49 & over	(4)	49-50	51-52	53-54	55-56	57-58	59-60	61-62	63+

Fig. 9.—Example of a 10-position code for indicating groups, sub-groups, sub-sub-groups, etc.(19)

third quarter (or, as expressed by the code, the first quarter of the second half) of the 17 to 32 age group. The necessity for needling four holes, as 2, 6, 7, and 9 for the 25 to 26 age group, would arise only on infrequent occasions.

(It can be seen that positions 5-10 have no meaning apart from the major-group coding.)

The above system may be contrasted with the conventional numerical-selective code which would require 9 positions (SF-2-1, O, SF-7-4-2-1) for coding the 32 different age classifications, without, at the same time, providing the facility for selecting larger age-groups.

An easy way of coding all the letters of the alphabet within a single 5-hole field is used on a number of cards. This coding is shown in Figure 10. Using the arrangement

Letter	Code	Letter
A	1	N
B	2	O
C	3	P
D	4	Q
E	5	R
F	6	S
G	7	T
H	8	U
I	9	V
J	10	W
K	11	X
L	12	Y
M	13	Z

Fig. 10.—Alphabetical code for use with the series NZ-7-4-2-1.

NZ-7-4-2-1, the first thirteen letters of the alphabet are coded by conventional notching (it being recalled that the 7-4-2-1 combination has a capacity of 14 classifications). To code the letters in the second half of the alphabet, the hole "NZ" is notched, along with the code number for the letter. In other words, the only difference between the notching of "E" (Code No. 5) and the notching of "R" (also Code No. 5) is that the second letter requires also the notching of the hole labeled "NZ."

"Mc" may be provided, if desired, by assigning to it No. 13, and assigning No. 14 to "M." "E-Z Sort" coding gen-

erally uses No. 13 for "Mc" and begins the second part of its alphabetical arrangement with "M," substituting "M(Z)" for "NZ" as the label for the fifth hole.

After separating the two halves of the alphabet by needling the "NZ" hole, cards which are coded as above may be sequence-sorted in the conventional manner. The Hadley Company, which recommends the above-described 5-hole method as ". . . the most flexible arrangement for alphabetic notching and sorting," indicates that the sorting process permits "4,000 cards . . . (to) be placed in alphabetical order to the third letter of the last name in one hour by a skilled operator."(20)

The writer has seen one card(21) on which the 5-hole alphabetical coding is combined with direct alphabetical coding. The section includes four fields of five holes each, the whole section lettered from A to Z (the letters GH, JK, PQ, VW, and XYZ are combined in order to reduce the total number of letter positions from 26 to 20). In addition to the four fields, three direct-sort holes are provided. Two of these additional holes are notched to indicate, respectively, the employment of the direct-coded alphabet (i. e., the 20 letters mentioned above), and the indirect-coded alphabets (the four M-7-4-2-1 series). The third hole is notched to signify the use of numerical coding, in which case the "M" of the M-7-4-2-1 arrangement is ignored.

(Librarians who have had no experience with marginal punched cards may find it advisable to skip the remaining section of this chapter. Such persons may proceed, without handicap, to Chapter IV, since pages 61 to 79 deal with types of coding but infrequently found in college and university library systems.)

Another 5-hole arrangement for alphabetical coding was originated by Cox. The revised code is shown in Figure 11.(22) (The five positions are labeled O-I-E-C-B, as will be explained below.)

The merits of this code are explained as follows: "It is . . . more mnemonic than a system using numbers, since the letters used are represented directly by the singly punched holes." Another advantage ". . . is that less

punching is required, as the letters most frequently used are represented in general by one or at the most by two punches. It is not required to punch 'a,' and three of the

Letter	Code	Letter	Code	Letter	Code
A	No punch	K	IC	S*	OE
B	B	L	ICB	Sch	OEB
C	C	M*	IE	S*	OEC
D	CB	Mac, Mc	IEB	T	OECB
E	E	M*	IEC	U	OI
F	EB	N	IECB	V	OIB
G	EC	O	O	W	OIC
H	ECB	P	OB	X	OICB
I	I	Qu	OC	Y	OIE
J	IB	R	OCB	Z	OIEB

*The "M's" are used before and after "Mac," respectively; the "S's" are used before and after "Sch," respectively.

Fig. 11.—"Revised coding for alphabetical index on the O-I-E-C-B system." (From Cox).

vowels, 'e,' 'i,' and 'o,' are shown by a single punch." The code is designed so that ". . . sorting is done in the same way as for numbered holes."(23)

Ames and Kujawski recommend a short cut in the sorting of cards which are arranged according to the above system. Referring to cards representing authors the first three letters of whose surnames have been coded by the Cox system, Ames and Kujawski say:

. . . we have found it very advantageous to needle a hole for each O-I-E-C-B field before attempting to sort for a given combination completely. For example . . . the code for the author, Hove, would be 1-ECB (first letter H), 2-0, 3-OIE (should be OIB). This would be found by needling I-B, 2-0, 3-1 (should be 3-I) and then manually sorting the remaining cards. We have found that the probability of another author's name resulting from this type of operation is relatively low. Much time can be saved by this modification,

and combinations not desired can be sorted manually more rapidly than the complete code can be needled.(24)

Dun shows how, by reference to a code based on geometric progressions, any number up to 4,095 can be represented in a single column (12 holes) of an IBM card.(25) If applied to marginal punched cards the geometric progression would provide for the additional coding power shown in Figure 12.

Number of holes	Conventional code	Capacity	Geometric progression code	Capacity	Additional capacity of g. p. code
...	1	...	1	...	...
...	2	...	2	...	...
3	4	...	4	...	...
4	7	14	8	15	1
5	1	19	16	31	12
6	2	39	32	63	24
7	4	79	64	127	48
8	7	149	128	255	106
9	1	199	256	511	312
10	2	399	512	1023	624
11	4	799	1024	2047	1248
12	7	1499	2048	4095	2596

Fig. 12.—Comparison of conventional and geometric-progression coding.

Young mentions the use of six holes in connection with the breakdown of a classification into sixty-four divisions.(26) Although he does not say that a geometric-progression code is used, he apparently employs this device. The writer can recall no other reference to the use, beyond the fourth position, of such coding. Nor have any of the hundreds of different cards which have come to his attention indicated the use of such a system.(27) Some of the disadvantages to its employment are patent, of course; but the arrangement does afford a means of coding the

maximum number of items in a given number of positions. The method of putting the cards in serial order (final sorting) is identical with the one used with cards according to the 7-4-2-1 arrangement.

Cox, Casey, and Bailey use the geometric progression, along with another adaptation, to convert the conventional selective code, SF-7-4-2-1-0, to a system for the coding of an additional five numbers. We have already seen that the selective code has the capacity to sort selectively the ten numbers, 0 to 9. The new code, employing the same number of positions, extends such a system to the selective coding of fifteen numbers, 0 to 14.(28) The notching pattern is shown in Figure 13. The "DF," used in conjunction with the zero position, stands for "Double Figure." Final sorting, with this code, is accomplished by using the standard procedure of needling from right to left, placing the fallen cards at the back of the pack. The SF and O-DF positions are ignored in such a process, just as the corresponding positions, SF and O, are ignored when

Number	Positions					
	8	4	2	1	O-DF	SF
0					O-DF	SF
1				1		SF
2			2			SF
3			2	1	O-DF	
4		4				SF
5		4		1	O-DF	
6		4	2		O-DF	
7		4	2	1		
8	8					SF
9	8			1	O-DF	
10	8		2		O-DF	
11	8		2	1		
12	8	4			O-DF	
13	8	4		1		
14	8	4	2			

Fig. 13.—"Improved Six-Position Selector Code." (From Cox, Casey, and Bailey.)

serially sorting selectively-coded cards labeled SF-7-4-2-1-0.

Instead of using the conventional 6-position selector code, from which the above arrangement is adapted, the University of Georgia Library employs a 5-position scheme (with the saving of one hole for each field) to achieve the same result. Ralph H. Parker, formerly librarian of the University of Georgia, has described this system in a letter to Stokes.(29) The code, in which the positions are labeled 5-4-3-2-1, is shown in Figure 14. Whatever disadvantage this system presents to a new

Number	Code
0	1 & 2
1	1 & 3
2	2 & 3
3	1 & 4
4	2 & 4
5	3 & 4
6	1 & 5
7	2 & 5
8	3 & 5
9	4 & 5

Fig. 14.—Five-position selective code, using the series 5-4-3-2-1.

staff member is soon overcome when the code has been committed to memory. The fact that the codes for four of the numbers (6, 7, 8, and 9) also add up to these figures, makes the application of the system just that much easier. The method of sequence sorting used with the 5-4-3-2-1 code is the same as that employed with the 7-4-2-1 series. Needling the holes, in turn, from right to left, will arrange the cards in exact order. In fact, if only a 1-field section is involved, hole No. 1 may be skipped over, the "O" (or whatever is represented by the code "1 & 2") sorting itself automatically to the front of the pack.

The marginal punched card system does not make too extensive a use of the type of combinations found in the

above arrangement. Where it is desirable, however, to employ such coding, Figure 15,(30) provided below, will be of some assistance. As well as providing the data indi-

Positions available	Number of classifications possible with specified number of notched positions		
	2	3	4
1	...	...	...
2	...	...	...
3	...	...	...
4	6	...	...
5	10	...	...
6	15	20	...
7	21	35	...
8	28	56	70
9	36	84	126
10	45	120	210
11	55	165	330
12	66	220	495
13	78	286	715
14	91	364	1001
15	105	455	1365
16	120	560	1820
17	136	680	2380
18	153	816	3060
19	171	969	3876
20	190	1140	4845

Fig. 15.—Total number of classifications made available by notching marginal punched cards a given number of times in a given number of available positions.

cated by the legend, the figure shows at a glance the number of total positions needed, and the total number of notches necessary to be used at the same time, to provide a given number of classifications. Referring to the figure, we see that the University of Georgia Library, using a field

of five positions (first column) can code ten different classifications (second column) by combining the five positions two at a time, just as was indicated in Figure 14. We see, also, that it would be possible to rearrange the 6-position selector code, given in Figure 13, so that not more than two holes need be notched at the same time. In other words, by adding the combinations 1 & 6, 2 & 6, 3 & 6, 4 & 6, and 5 & 6 to the arrangement shown in Figure 14, we would provide the same selective-sorting and sequence-sorting features as are found in Figure 13.

The disadvantage of the above arrangement, however, is that it would require memorization of the code—a disadvantage not applicable to Figure 13. Use of combinations where twelve or fifteen positions are employed, notched three or four at a time, would naturally involve reference to a code too complicated to commit to memory.

The formula for determining the combinations of the type which we have been considering, is where "n" equals the

$$\frac{n!}{(n - r)!\, r!}$$

total number of positions and "r" equals the number of notches used at one time.(31) The "!" indicates "factorial," i. e., the product of 1 x 2 x 3 x 4 . . . up to and including the number represented by "n." Thus the number of combinations formed by using seven positions, notched three at a time, would be

$$\frac{7!}{(7 - 3)!\, 3!} \text{ or } \frac{1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7}{(1 \times 2 \times 3 \times 4)(1 \times 2 \times 3)} = \frac{5040}{144} = 35.$$

Simpler formulas for use when two, three, or four positions, respectively, are to be notched at once, are shown in Figure 16. ("n" represents the total number of positions).

The advantages of the selective code of the conventional type will have to be weighed against those of the system just described, which generally demands a greater coding area, but may require fewer notches. The number 4,845, for instance, requiring only four notches if coded according to Figure 15 (using 20 positions), requires eight notches with the selective-numerical code (using 14 positions).

Number of notches to be used at same time	Combinations
2	$\frac{n(n-1)}{2}$
3	$\frac{n(n-1)(n-2)}{6}$
4	$\frac{n(n-1)(n-2)(n-3)}{24}$

Fig. 16.—Simplified formulas for determining total number of classifications when 2, 3, and 4 notches, respectively, within a given number of available positions, are needled simultaneously.

Triangular Coding

A coding system which has created a considerable amount of interest was developed by Cox, Casey, and Bailey, who based their arrangement on a scheme used originally by the Dow Chemical Company.(32) Employing only five holes, the new code (Fig. 17), the labeling for which takes the shape of a triangle, can provide for the same type of selection and sorting as can the conventional 6-hole arrangement.

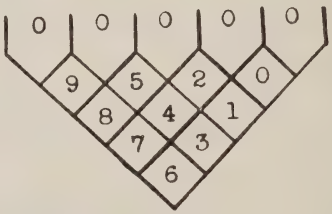


Fig. 17.—"Triangle selector code, with symbols arranged . . . to permit serial sorting . . . ." (From Cox, Casey, and Bailey).

To code one of the numbers, 0 to 9, the two holes should be notched whose diagonal columns intersect at the given number. For instance, the first and last holes would be

notched for No. 6, the third and fourth (from the reader's left) for No. 2, etc. (The coding is exactly the same as that shown in Figure 14, p. 65; the difference lies in the labeling pattern only.) The same notching arrangement would apply, of course, to the use of this system with fewer or more holes. Since only six combinations would be available with a 4-hole field, this pattern would hardly have advantages over the direct-coding method. Six and seven positions, however, would provide fifteen and twenty-one combinations, respectively.

Triangular coding will be considered again, at greater length, when double-row holes are dealt with (pp. 75-77).

Superimposed Coding

All of the coding arrangements which have been presented thus far provide for the notching of only one number or letter—or whatever the data may be—in each field of a particular card. Gull mentions his experiments ("with some success") in punching more than one number in the same field on the same card.(33) Isbell has worked out a system whereby such punching may be done in a scientific manner.(34) The technique, ". . . based on the laws of mathematical probability and developed by Dan Merrick, an executive of the McBee Company . . .,"(35) consists of the assignment to the desired classifications of a combination of randomly chosen numbers. Isbell employs a 5 x 8-inch card, across the top and bottom edges of which are holes numbered 1 to 29, and 30 to 58, respectively (in addition to holes along both short edges which are used for purposes of no concern to us here). Each of the classifications which he uses is coded with a combination of five numbers, three of which are selected at random. The other two numbers, which really designate a sub-class, are formed by assigning to the first major class the combination 1 and 2, 1 and 3, 1 and 4, etc., up to 58 if necessary; and to the second major class, the combination 2 and 3, 2 and 4, etc. For example, the first major class might have the combination 9-14-37 (selected at random, as will be described below). The fourth and fifth units of the 5-unit

series, constituting the sub-class numbers, would be 1 and 2, respectively. The second sub-class of the same major class (9-14-37) would be 1 and 3. The second major class might have the combination 22-29-56, and its first sub-class would be represented by the numbers 2 and 3; and so on. The fifth number, i.e., the second of the sub-class combination, should not duplicate any of the first four numbers, therefore only 54 of the 58 numbers are usable in this position; but if more than 54 sub-classes are desired for the same major class, one or more of the succeeding series may be employed for this purpose.

To insure random distribution of the three numbers used for the major classes, Isbell places 58 metal discs in a glass jar. The discs, of equal size and weight, each bearing one of the numbers in the series 1 to 58, are completely mixed up before each drawing. If numbers, say, 6, 23, and 41 are drawn, this combination is entered in a code book beside the particular classification which it represents. The combination is also entered on a sheet which bears other combinations whose total is the same as this one, i. e., 70. When the next series of numbers is drawn from the jar, the sum of such numbers is checked with the appropriate sheet to determine whether the same combination has been used before. If so, the discs are replaced and a new combination selected.

Some of the more technical aspects of this type of coding are of interest.

> . . . he (Isbell) . . . chose a five number code for two primary reasons: First, although five numbers are simpler to handle and are mathematically more efficient than six or more, they give him the possibility of coding 4,582,116 individual ideas. In contrast, the use of four numbers offers the mathematical possibility of coding 424,270 separate subjects, and the use of three numbers drops the total to only 30,856.
>
> Although even the 30,856 headings that could be coded with three numbers would be adequate, Isbell adopted the five because of still a second consideration: the "selectivity" of his sorting method. Since he hoped to cross-

reference an average of five times on each card, he faced the possibility of duplicating numbers so that a certain percentage of "extra" cards on unrelated subjects might drop during a sort for one particular idea . . . .

Mathematically, the number of cards that will drop during an average sorting is expressed by the formula $(1/A)^n$, where 1/A is the fraction of the total number of holes punched . . . and n is the number of holes used to designate a single subject. If, then, Isbell had used a four-number code and had punched an average of one-half of the total 58 holes per card, he would have expected one card to drop from every 16 cards sorted, ($(1/2)^4 = 1/16$). By using a five-number code, however, he reduced the average to one card in 32 ($(1/2)^5 = 1/32$) . . . .

Since he wanted still greater selectivity, Isbell then decided to hold the number of holes punched per card to approximately 1/3 of the total, obtaining an average of less than one extra card in 243 cards sorted ($(1/3)^5 = 1/243$).(36)

At the time of the publication of the article cited above, Isbell had been using the system for almost a year, and ". . . thus far he hasn't found a major flaw."(37)

The coding of all classifications in a single field; the employment of randomly selected numbers;(38) and the sorting out, with the wanted cards, of small percentages of unwanted ones—these features mark the above system as perhaps the most radical departure from conventional marginal-punched-card coding methods.

Coding and Sorting of Cards with Double-Row Holes

Having explored the coding and sorting techniques used in connection with the single row of holes, we turn now to a consideration of the double row.

The obvious reason for using two rows of holes instead of one is to increase the coding capacity of a given card. Having twice as many holes available, however, does not always mean a proportional saving of card space and sort-

ing time. This condition follows from the fact that notching an inner hole necessitates the notching of the corresponding outer hole also.(39)

One of the most common ways in which the inner row is used, is in providing a 4-position field for the selective sorting of nine classifications. The "SF" hole, necessary for selective sorting with the one-row arrangement, is not required with the double-row setup. The substitute technique is to "deep notch" the single figure. Thus, for No. 4, both the holes at this position would be notched, the operation forming one deep slot. Combination numbers would be "shallow notched," just as in the single-row method. Also, just as in the single-row method, sequence sorting through only the top row of holes will arrange all of the cards in exact order.

Selective sorting of the combination numbers is accomplished with the selector unit, using two needles at once. To select one of the "single figures," the deep hole in that position is needled.

We see that where only one field is involved, the 8-hole system described above saves only one position (the "SF" position) over the single-row, 5-hole selective code. The fact, however, that a single deep punch is easier and quicker to make than two shallow punches (in the case of four of the numbers), provides a further advantage.

If the zero is used, it must be provided for under the same conditions as with the single-row system (i. e., it would be essential with the employment of two or more fields.) Where two zeros are needed, they may be in a vertical relationship with respect to each other, shallow and deep notching being used to distinguish between them.

If sorting on a selective basis is not required, the 4-position, double-row field may be used for as many as twenty-eight different classifications, simply by using the full 14-classification capacity of each row.

It must be kept in mind that whenever an inner-row hole is needled, only those cards which are needled through this hole in this position will drop out; but whenever the outer-row hole is needled, cards which are notched at this position for both inner- and outer-row holes will fall.

This latter fact may be put to profitable use in assigning to the inner row those classifications which have a high probability of being called for, and in assigning low-probability classifications to the outer row.

Krieger made a study of the frequency of occurrence of initial letters in several subject indexes and then set up an alphabetical arrangement based on his findings.(40) By assigning to the first inner hole the letter with the highest probability of occurrence, and to the first outer hole the letter with the least probability, moving toward combinations that, at the far right of the field, would be approximately equal in their probabilities of occurrence, Krieger established an arrangement whereby letters of the highest probability could be direct-sorted (by the needling of the inner hole only). As was explained above, the needling for one of the low-probability letters in the outer row would involve the separation, from the cards with this letter, of all the cards which had been deep-notched in that particular position. But this simple operation can be performed with a single pass of the needle through the inner hole of the fallen cards.

Ames and Kujawski use the deep hole to indicate a subgroup of the larger group designated by the shallow punch.(41) As an illustration they cite the use of the shallow-punched hole for "nutrition" and the corresponding deep-punched hole for "vitamins." Whenever the main classification is desired, a single sort will drop it out, along with its sub-class. But when only the cards for vitamins are wanted, a single sort will separate them from the main class at the same time that it separates them from the other cards in the pack.

Guy and Geisler employ an alphabetical code in which the inner row is used for indicating the first letter of an author's name, and the outer row the second letter.(42) In case of a name such as "Eells," the initial letter would be deep-notched as usual, and an extra hole, designated "D" for duplicate, would be notched to indicate the second letter. In this arrangement the probability factor is not taken into account.

Jellinek, Efron, and Keller employ an ingenious coding of

double-row holes whereby as many as sixty-nine sub-classes may be used with each main class.(43) Around three edges of their card are single-row holes bearing the numbers 1 to 49. At the bottom edge, in double-row arrangement, the numbers 50 to 70 are indicated in the outer row, and the twenty-one letters of the alphabet (skipping I, O, Q, U, and Y) in the inner row. For purposes of illustration let us say that the "A" position, representing a particular classification, is deep-notched. This operation eliminates No. 70 as a direct-sort possibility for a sub-class, since "70" is the outer hole which corresponds to the inner hole "A." But there remain, for sub-class use, all of the forty-nine single-row numbers, plus the outer-row numbers 50 to 69.

This arrangement, of course, can be expanded or contracted to suit special requirements. The card may be increased in size—the one used appears to be 4 x 6 inches—to provide more sub-classes, or the double row of holes may be extended to one or more of the other three sides of the card, and numbers substituted for letters to provide, if

Number	Code	
	Deep notch	Shallow notch
1	1	2
2	1	3
3	1	4
4	2	1
5	2	3
6	2	4
7	3	1
8	3	2
9	3	4
10	4	1
11	4	2
12	4	3

Fig. 18.—Code for indicating 12 classifications in a 4-position field of double-row holes. (From Guy and Geisler).

desired, as many classes as the marginal area allows.

To gain the maximum number of classifications for selective sorting from a single field of double-row holes, Guy and Geisler have provided a code based on an arrangement of combinations similar to the one used with the single-row holes.(44) This code, using a 1-2-3-4 series, is shown in Figure 18. To accomplish sequence sorting with this pattern of notching, it is necessary, after following the regular routine in connection with the outer row of holes, to needle the inner row in the same manner.

Double-Row Triangular Coding

The same capacity as in the above figure can be achieved with the triangular code. This arrangement, as developed by Cox, Casey, and Bailey, is indicated in Figure 19.(45)

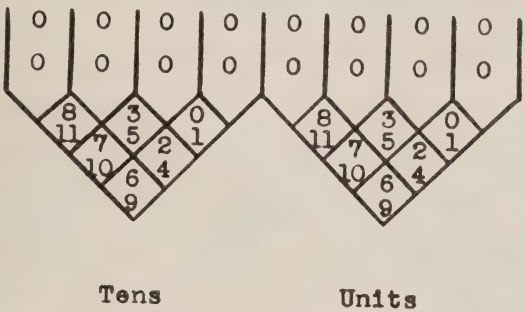


Fig. 19.—Double-row holes used with triangular coding for numerical-sequence sorting. (From Cox, Casey, and Bailey).

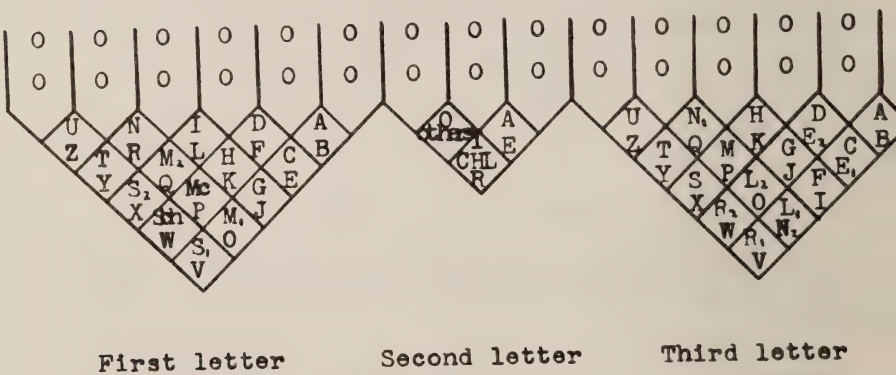
Just as in the single-row setup, a given number is coded by notching the holes whose diagonals intersect at the number. In this case, however, a distinction must be made between the upper and the lower figures. Such a distinction is made by coding upper numbers with a shallow-deep combination and the lower numbers with a deep-shallow combination. Thus the number "71" would be coded by shallow-notching the first position and deep-notching the third position in the tens field, and by deep-notching the

third position and shallow-notching the last position in the units field.

Cards that have been notched according to the above scheme can be serially arranged by needling, in turn, the right-most hole in the outer row, then the corresponding hole in the inner row, proceeding in this up-and-down fashion from right to left.

Triangular coding with double-row holes is employed by Cox, Casey, and Bailey in connection with authors' names. First, a study was undertaken to determine the frequency of occurrence of the first, second, and third letters of proper names. For this purpose the Chemical Abstracts' author index, American Men of Science, and two private bibliographies were analyzed for letter distributions, and the results tabulated. From the information gained in this procedure Cox and his collaborators developed the triangular codes shown in Figure 20.(46)

The designers of this code point out that ". . . where



In the first-letter field, M_1 and M_2 indicate M before and after Mc, respectively; S_1 and S_2 indicate S before and after Sch, respectively. In the third-letter field E_1, E_2, L_1, L_2, etc., indicate the first and last halves of the alphabet, respectively, for the fourth letter of the author's name.

Fig. 20.—Double-row triangular arrangement for coding initial three letters of authors' names. (From Cox, Casey, and Bailey).

'C,' 'H,' 'L,' 'R,' or 'others' represents the second letter, some hand sorting will be required . . . ."(47) The character of the middle triangle also makes it impossible for sequence sorting to result in perfect arrangement of the cards; but, as the authors of the article indicate, a 6-position field can be substituted for the 3-position one where exact sequence arrangement, without the necessity for some hand-sorting, is regarded as very important.(48)

One of the chief advantages of the triangular arrangement, especially when used with the double row of holes to code a large number of classifications, ". . . is that the digit or letter may be read directly from the code on the card without the necessity of referring to, or remembering, a combination of letters or figures, or both."(49)

"Center-Punch" Coding

We have not yet considered another technique by which still more data may be coded on the card having a double row of holes. This technique consists of using a "center punch" to slot away that part of the card between two vertically aligned holes. Thus we have three different ways of notching a double-row card: shallow, deep, and center (or middle).

The same procedure is used in coding center-punched cards as is used in single-row coding: one slot in the single-figure positions, and two or more slots for combinations.

Krieger(50) and others have commented on the inconvenience of sorting cards which have been center-punched, but the added coding capacity made possible by this means may be, at times, sufficient justification for its use.

Since center-punched cards are not slotted all the way to the margin, they will not fall free of the needle during the sorting process. However, they will fall the length of the slot—or, to be more exact, the length of the slot less the diameter of a hole—and this quarter-of-an-inch fall is sufficient to permit the insertion of a needle in one of the corner holes of the outer row (since corner holes are not used for regular sorting, and would be unnotched). The

original needle is then withdrawn and the center-punched cards drop out, while the unwanted cards, except those which may be deep-notched in this position and which will already have fallen, remain on the needle. If it is necessary to separate center-punched from deep-punched cards, one pass of the needle will accomplish this purpose.

Cox, Casey, and Bailey refer to the use of independent coding of outer and inner rows of holes when they suggest the use of the 6-position selector arrangement (Fig. 13) for alphabetic coding. The outer row of letters, A-M, would be shallow-notched, and the inner row, N-Z, center-punched.(51)

As if the complications of double-row use were not enough, we find that on some occasions even three rows of holes are used. Allen says that a ". . . Dr. McWhirter of Edinburgh has evolved a card which is punched on all four sides by a triple row of holes, and by this means the card is made to incorporate an enormous amount of information, so much so indeed that without a key it is almost unintelligible."(52)

Dyson shows that whereas only three different types of punches are possible with double-row use, the 3-row card may be punched in any one of seven different ways: shallow; deep to the second row; deep to the third row; upper center (i. e., connecting the upper two holes); lower center; double center (connecting top and bottom holes); and combination lower center and shallow.(53)

Dyson gives the formula for figuring the total number of different notching possibilities for any number of rows.(54) A card having four rows of holes has recently been developed by E-Z Sort Systems.(55)

Of even the much simpler two rows, the following comment has been made: "Coding can be overdone to a point where it defeats its primary purpose, which is to simplify selection from a file. The double punch invites the setting up of highly complicated codes, as well as coding of non-essential classifications."(56)

On the other hand, for the user who, for one reason or another, wants maximum classification capacity within a limited marginal area, the resourcefulness of the codes for

double-row cards is at his command.

FOOTNOTES

1. The McBee Co. McBee Keysort. Athens, Ohio, The Co., c1943.
2. The E-Z Sort Systems claims 100,000 sorts per hour. (E-Z Sort Systems, Ltd. E-Z Sort. Los Angeles, The Co., n. d.)
3. Baehne, G. W., ed. Practical Applications of the Punched Card Method in Colleges and Universities. New York, Columbia University Press, 1935, p. 7.
4. "E-Z Sort."
5. Cox, Gerald J., C. F. Bailey, and Robert S. Casey. "Punch Cards for a Chemical Bibliography." Chemical and Engineering News 23: 1625, September 25, 1945.
6. The McBee Co. McBee Keysort Manual. Athens, Ohio, The Co., c1942.
7. A section consists of the one or more fields required to code a particular classification. For instance, on the card shown in Plate I (p. 24), four fields have been assigned to the "Name" code; all four fields taken together, then, would constitute the section.
8. The Charles R. Hadley Co. Sorting Alphabetically and Numerically with Rocket. Los Angeles, The Co., n. d.
9. The needling of the holes, in turn, from right to left, and the placing of the fallen cards at the back of the file, described on pp. 18-19.
10. Perkins declares that sequence sorting can ". . . easily be done when needling by hand a stack of cards not exceeding 500; larger quantities up to three or four thousand can be sorted simultaneously in this manner by using a sorting box." (U. S. patent 1,739,087 of Dec. 10, 1929.) The writer, however, has seen no other reference to the sequence sorting of such large quantities of cards. The marginal punched card manufacturers have no facilities for increasing the rate of sequence sorting beyond that which can be attained with the use of the conventional sorting needle.
11. The Hadley Co. Sorting Alphabetically. . . . Op. cit.
12. The McBee Co. McBee Keysort Manual. Op. cit. The McBee Company's use of a key as its trademark has helped to make the name "Keysort" almost synonymous with the marginal punched card system.
13. "Linedex," available from the Remington Rand Co., is suitable for this purpose. Voigt recommends Acme

Rotating Frame Books, manufactured by Acme Visible Records Inc. (Voigt, Lorraine R. "Punched Cards for Filing Corrosion Test Results." Corrosion 4: 588, December 1948.)

14. Voigt. Loc. cit.

15. A full 7-4-2-1 field is implied here. By definition, the series 4-2-1, or 2-1, or even "1" by itself, may also constitute a field.

16. The fact that the cipher appears only once in the code obviates the necessity for using the "SF" with it.

17. A special sorter with multiple needles will be described later. Meanwhile the reader need bear in mind only the fact that the combination of 4 needles operates exactly as if 4 single needles were used simultaneously.

18. The Findex Co. Findex Classification Manual. Milwaukee, The Co., 1929, p. 29.

19. Ibid., pp. 29-30.

20. The Hadley Co. Sorting Alphabetically . . . Op. cit. (Hadley Co.'s italics) The use of a 3-field section is assumed.

21. An "E-Z Sort" card used by the Massachusetts Mohair Plush Co.

22. Casey, Robert S., and C. F. Bailey. "Punch Card Techniques and Applications." Journal of Chemical Education 23: 497, October 1946. The original code appears in Cox, Bailey, and Casey. Op. cit., p. 1626.

23. Cox, Bailey, and Casey. Loc. cit.

24. Ames, Stanley R., and Wilma F. Kujawski. "Use of Punched Cards for Indexing and Classifying Biochemical Literature." Special Libraries 39: 236, September 1948.

25. Dunn, Halbert L. "Adaptation of New Geometric Code to Multiple Punching in Mechanical Tabulation." Journal of the American Statistical Association 27: 279-86, September 1932.

26. Young, George G. "Library Uses of the Marginal Punched Card." California Library Association Bulletin 8: 96, March 1947.

27. One exception would be found in the case of the University of Toronto, where the library formerly used, on its "Keysort" cards, a geometric-progression code (up to ten positions, i. e., with a capacity of 1023), but the labeling, instead of consisting of the series 1-2-4-8-16-etc., was alphabetic. Within the past year the library has changed to the standard 7-4-2-1 arrangement. (Letter, June 15, 1950, from R. H. Blackburn). The marginal punched card system used in this library is described in Newton, May L., and

Robert H. Blackburn. "A Punched-Card Charging System." Canadian Library Association Bulletin 6: 40-42, September 1949. No mention is made in the article, however, of geometric-progression coding.

28. Cox, Gerald J., Robert S. Casey, and C. F. Bailey. "Recent Developments in Keysort Cards." Journal of Chemical Education 24: 70, February 1947.

29. Stokes, Katharine M. "A Librarian Looks at Keysort." Library Journal 72: 911, June 1, 1947.

30. The Findex Co. Findex Classification Manual. Op. cit., p. 23. (Abridged).

31. Rosenbach, Joseph B., and Edwin A. Whitman. College Algebra, 3d ed. Boston, Ginn & Co., c1949, p. 412.

32. Cox, Casey, and Bailey. Op. cit., p. 68.

33. Gull, C. D. "Discussion of Miss Hoag's Article." Special Libraries 38: 206, September 1947. (Reference is to Hoag, Mary. "Indexing Union Contracts." Special Libraries 37: 106-10, April 1946.)

34. "Facts with a Punch." Progress Thru Research 3: 6-8, Fall 1948.

35. Ibid., p. 6.

36. Ibid., pp. 7-8.

37. Ibid., p. 8.

38. The use of a published set of random numbers may well be substituted for the metal discs used by Isbell. Two such lists are as follows: "Random Numbers." In Fisher, Ronald A., and F. Yates. Statistical Tables for Biological, Agricultural and Medical Research. London, Oliver and Boyd, 1938, pp. 82-87; and "Ten Thousand Randomly Assorted Digits." In Snedecor, George W. Statistical Methods Applied to Experiments in Agriculture and Biology, 4th ed. Ames, Iowa, The Iowa State College Press, c1946, pp. 10-13.

39. An exception to this statement will be noted later, in connection with the use of the "center punch." (pp. 77-79).

40. Krieger, K. A. "A Punched-Card System for Chemical Literature." Journal of Chemical Education 26: 163-66, March 1949.

41. Ames and Kujawski. Op. cit., pp. 234-35.

42. Guy, A. G., and A. H. Geisler. "A Punch Card Filing System for Metallurgical Literature." Metal Progress 52: 995, December 1947.

43. Jellinek, E. M., Vera Efron, and Mark Keller. "Abstract Archive of the Alcohol Literature." Quarterly Journal of Studies on Alcohol 8: 580-82, March 1948.

44. Guy and Geisler. Op. cit., pp. 994-95.

45. Cox, Casey, and Bailey. Op. cit., p. 68.
46. Cox, Casey, and Bailey. Op. cit., pp. 68-69.
47. Ibid., p. 69.
48. Loc. cit.
49. Loc. cit.
50. Op. cit., p. 165
51. Cox, Casey, and Bailey. Op. cit., p. 70.
52. Allen, E. Peter. "A Punch Card for Neoplastic Diseases." New Zealand Medical Journal 42: 122, June 1943.
53. Dyson, G. Malcolm. "Punched-Card Systems and Their Application to Library and Technical Work." In the Association of Special Libraries and Information Bureaux. 22d Conf. Proceedings. London, The Association, 1947, p. 29.
54. Ibid., p. 30.
55. Letter dated July 2, 1951, from J. W. Perry.
56. Rostler, Kathleen S. "Application of Punched Cards to Indexing Rubber Compounds." India Rubber World 120: 699, September 1949.

CHAPTER IV

THE USE OF MARGINAL PUNCHED CARDS IN THE CIRCULATION DEPARTMENT

The Main Loan Desk

The Use of Marginal Punched Cards as "Call Cards"

The announcement of a new installation.—While the installation of the marginal punched card system in the circulation department does not change essentially the procedure to which the students and faculty members have become accustomed, the proper kind of advance publicity, designed to smooth the way for the new method, is always appropriate.

At the American University a mimeographed letter(1) ". . . was sent to all faculty members at the beginning of the semester in which we called special attention to the system. We also had posters printed (12" x 18") announcing the system and explaining the use of the card and the proper way to fill in the information."(2) In part, the announcement read as follows: "(The new system) . . . will require some adjustment in the library habits of faculty and students but we believe it will, if properly operated, greatly improve the library service as well as give much needed information on the effectiveness of the libraries as a teaching and learning instrument."

Consolidation of class and date-due files.—The conventional charging system in most college and university libraries is built around two principal files; one made up of the book cards of volumes in circulation, and arranged by call number; and the other made up of slips which have either served as call slips or which the borrower is asked to fill out simply in order that a second record may be kept—a record arranged by the dates on which the books are due.

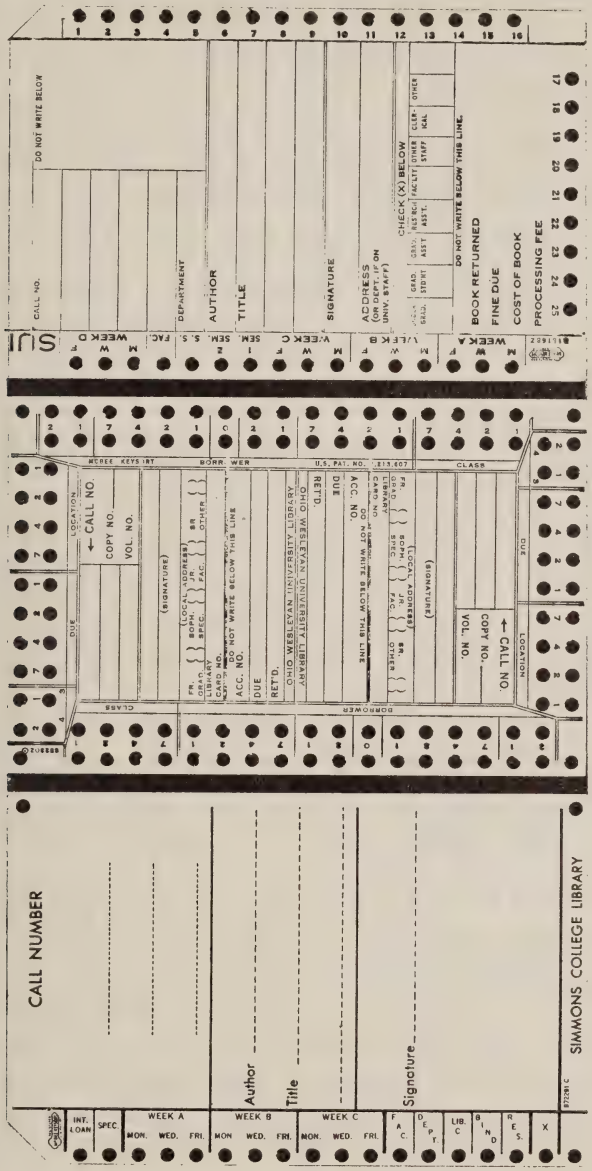
In some libraries a double book-card system serves the

same purpose. The borrower signs one or both cards (depending upon the regulations made by the circulation department), and one card is filed by call number and the other by date due.

It was the inconvenience and expense of the 2-file charging system that led Kilgour to search for a means of combining the functions of both files into one.(3) The marginal punched cards—since they can be arranged in any desired order, just as ordinary file cards, and since they can be notched to indicate the information which has heretofore been supplied by the second file—were the answer to his problem.

The Kilgour card provided only nine holes, labeled "M," "W," and "F" (for Monday, Wednesday, and Friday) for each of three weekly periods.(4) (The Simmons card, Plate V, shows a similar arrangement.) Briefly to review the routine at the charging desk, let us suppose that a book is due on Wednesday of the first weekly period. The marginal punched card, which the borrower has filled out as a call card, and which therefore bears his name and address and the call number of the book, etc., is notched in the Wednesday position of "Week A." The card is then ready for filing in the central file which is arranged by call number. If the book is returned on time, it is discharged in the conventional manner. If, however, the book becomes overdue, the following procedure is used: All the cards in the central file are needled in the Wednesday position of "Week A," whereupon all cards representing books overdue on this day drop out. After the assistant secures the necessary information for sending the overdue notice, the card is notched in the Wednesday position of "Week B," and refiled. Unless the book is promptly returned, the card will then drop out a week later when this position is needled. A second notice is sent; the card is notched again, this time in the Wednesday position of "Week C"; and the process is repeated. The following week, when the Wednesday position of "Week C" is needled, the card will drop out again, for a third overdue notice. If the book is not returned, the card will now, without further attention, automatically drop out every week, for whatever attention is required, since all

PLATE V. Samples of Marginal Punched Call Cards



three of its Wednesday positions are notched.

The fundamentals of this system are still followed by the circulation departments of most college and university libraries which use marginal punched cards. To be specific, the following libraries use the same three weekly periods (designating them either "A," "B," and "C"—the more common labeling—or "1," "2," and "3") and the same three days of the week (Monday, Wednesday, and Friday): Arkansas, Brown, Indiana, New Hampshire, North Carolina, Penn State, Purdue, Simmons, and Tennessee.

American University, Iowa, and Tulsa use four weekly periods instead of three. (Iowa formerly used three periods, but, in re-designing its card, added a fourth week.) Texas College provides direct-coded holes for the six days, Monday through Saturday—the sorting for overdues being done daily.

Books at the University of New Mexico are due on Tuesdays, Thursdays, and Saturdays, but the notching is done on the following days; so the "M," "W," and "F" on the card indicates the notching dates instead of the due dates. The call card was designed for only a 3-week arrangement, but four weeks are used now. Holes 1, 2, and 3, adjacent to the "Week C" group, either included on the card as extras, or intended for another specific purpose, have been utilized for "Week D."(5)

Cornell, Georgia, and Illinois use five weekly periods in connection with their charging systems.

A variant routine for sorting overdues.—The Iowa system of handling overdues, after the second weekly notice has been sent, departs from the conventional procedure.

> The second time the card falls out, the oldest punch is covered by a card saver. In this way the card will be needled one month later. At this time it is checked with the shelf list and shelves. We do not check our shelves or shelf list prior to that time as the few errors compared to number of overdues does not make it profitable. After checking at this time to see positively that it is not some error on our part, the card is returned to the file until it is needled again another month later. At this

time the patron is sent a notice saying that the records have been transferred to the business office and all payments must be made there. Our . . . card is then stamped at the top "Lost." All punches except number 16 (. . . the punch for lost (books) . . .) are covered and the record at the bottom of the card shows the amount of fine due, the cost of the book, and the amount of the processing fee. A duplicate of this card has been sent to the business office. When records are cleared at the business office we receive the report and mark the original card "Pd. at B. O." with date of payment. If a book is returned within two years from date of overdue, the cost of the book is refunded, as well as processing fee if the book has not been reordered.(6)

Once-a-week due dates.—The Arizona card was evidently designed for use with a circulation system in which the books were marked to fall due on only two days a week, Tuesdays and Fridays (eight holes are provided for weeks A - D, with a "T" and "F" hole in each weekly group). At present, however, books are due only once a week (Tuesday),(7) and the "F" hole is used for another purpose.(8)

Indiana formerly used the Monday, Wednesday, Friday arrangement with three weekly periods, but its present card provides for only the Wednesday and Friday positions in each of four weekly periods; moreover, since this library now sorts out overdues only once a week, only four of the eight available holes are used. The due date is Monday and the overdues are pulled on Wednesday. The circulation department ". . . used to sort the day after due-date; but so many books are returned one day late, that considerable work and time is saved by allowing this one extra day for stragglers."(9)

Of interest to many librarians will be Boardman's statistics on the amount of time required to sort out the cards representing overdue books:

Our file of approximately 50,000 cards is contained in 29 19-inch trays. On an average, the regular Wednesday morning sorting takes one assistant one hour and a half. Arranging the cards by first, second, and third

notice requires about 15 minutes; re-arranging and re-filing, from half an hour to an hour, depending on the number of cards. Far more time is needed to make out and address the overdue notices than is required for the sorting, arranging, and filing put together.(10)

At Ohio Wesleyan the date due section consists of one double-row field labeled 7-4-2-1 (See Plate V, p. 85). The original intention was to use the selective feature of this arrangement by assigning the first four numbers to four weekly periods,(11) and Nos. 5 to 8 to "1st Semester," "2nd Semester," "Summer," and "Indefinite," respectively (No. 9 was unassigned). This plan was changed, however, in favor of a decision to check through all the cards in the central file at least once a semester to catch possible mistakes and, in general, to review the charges. The classifications denoted by Nos. 5 to 8, above, were therefore not used. A second modification in the procedure, at about the same time, resulted in the assignment of the inner row of the date-due field to another purpose (to be described later in the chapter), so the library began to use the 7, 4, 2, and 1 holes, in the outer row, as direct codes, respectively, for the four weekly periods.

After sending the first overdue notice, the practice here is not to repunch the card so that it will drop out the following week, but to refile it without renotching. It will then not come to the circulation department's attention until time to needle the same position four weeks later. The second overdue notice is sent at this time if, meanwhile, the book has not been returned.

The use of clips to supplement "Keysort."—North Carolina has modified, with a novel technique, that part of its routine which is connected with overdue charges. The following description is quoted from a letter written by George F. Bentley, Circulation Librarian: "The old circulation system called for extensive use of colored enameled clips to indicate overdues, holds, etc. It occurred to me that, since we had those clips, they could be used with the Keysort cards and make for even greater speed and efficiency. This has proved to be a successful 'marriage'...."

The cards are handled according to the Kilgour pattern, described above, until the first overdue notices have been sent. Then the modification is introduced. Before returning the charges to the central file, each card

> . . . is clipped with one of the three colored clips representing overdue days. Clipping obviates the necessity of repairing the cards and of needle sorting for second notices . . . Since there are seldom more than 15 second notices, sorting 20,000 cards for them would be a ridiculous waste of time. When second notices are sent a second clip, of the same color as the first, is attached to the card. When bills are sent a third clip is attached and books are declared lost if no acknowledgement of bills is received. (12)

It should be noted that the North Carolina card is unperforated along the top. When a card is used which has holes along this edge, there is seldom room for one clip—let alone two or three—without interference with the sorting system. It should also be pointed out that where there is any likelihood of clipped cards being sorted out, in connection with classifications notched at the bottom of the card, care must be taken that the clipped cards are specially handled as they drop from the needle. Fortunately, at North Carolina, the card was designed so that the date-due coding is at the bottom, and the holes represented in this code are no longer used after the clipping operations begin. The only other hole at the bottom of the North Caroline card, in addition to those for date due, is one which designates faculty charges, but since such charges are for extended periods, the cards representing them would not be clipped.

Since the above arrangement has proved to be, for North Carolina, ". . . a most satisfactory combination" of two systems,(13) other libraries, whether having the clips already on hand or not,(14) may want to use them in conjunction with their marginal punched cards. Provision of clips in a sufficient variety of colors would make it possible to use only one clip per card at any one time; and if the top of the card has no unperforated space available for the

attachment of the clip, one of the unused corner holes could be covered.

The Mayo Clinic Library uses a small gummed flag as a sorting aid. The flag also "serves as an added check if the book is kept longer then a temporary charge."(15)

One advantage of using a signal of the paper-sticker type —this advantage is not used or mentioned by the Mayo Clinic Library—is that the flag may be punched with a ticket-punch from the dime store before it is applied over the hole; or it may be applied and then pierced with the sorting needle or with some other pointed instrument.

Description of the call cards.—Before proceeding further with the various routines used in connection with college and university library charging systems, it would probably be helpful to describe the physical appearance of the call cards which are now being used. Arizona, Arkansas, Indiana, New Mexico, North Carolina, and Texas College all use 3 x 5-inch cards. The less expensive 3 1/4 x 5 size (see p. 31) is used by Brown,(16) Cornell, Illinois, Iowa, New Hampshire, Ohio Wesleyan, Penn State, Simmons, and Tulsa. Tennessee uses a 3 x 6 card, and Georgia and Purdue use a card 3 1/4 x 6.

Most of the circulation departments have designed cards which are perforated along the two sides of the long dimension and at the bottom. American University, Arkansas, Cornell, Iowa, New Hampshire, Penn State, Purdue, and Tulsa all use such cards. Arizona, Brown, Indiana, and New Mexico provide for some unperforated space (1 1/2 inches in the case of Indiana and New Mexico; 2 inches in the case of Arizona and Brown) along the right side at the bottom,(17) in order to allow more room for the borrower's name and address, etc. The card used by Brown places the author and title lines also at a position such that this wider writing space is available.

The Texas College card is perforated at the top and bottom, and on the right side. Simmons utilizes only the left side of its card, as was the practice formerly at Harvard College; North Carolina and Tennessee have cards which are perforated on the left side and at the bottom; and Georgia, Illinois, and Ohio Wesleyan use cards with holes on all

four edges.

By using both inner and outer rows of holes; by providing rather narrow spaces for call number, signature, etc.; and by omitting the conventional request for author and title information, (18) Ohio Wesleyan is able to make double use of its call card: the top half and the bottom half are identical (see Plate V, p. 85). It does not matter which end the borrower uses first, but after that end has served its purpose, it is "scratched" (with a large crayon) and the other end is then used. The desk assistants are careful to keep the cards in the proper order; consequently the lack of a clipped corner has not been a handicap.

The limited writing space is slightly disadvantageous to the assistants since some strain is occasionally involved in reading the information supplied by the borrower. In general, however, it has been found that the borrower will accommodate the size of his writing to the space within which it must go. In any event, it was thought that cutting the cost of the call cards by fifty per cent would more than compensate for the necessity on the part of the borrowers to confine their writing to narrow limits.

Renewals.—It is probable that in most of the circulation departments using marginal punched cards, renewals are handled by redating the original call card. Hood and Lyle indicate that the routine of having the borrower fill out a new call card ". . . is most satisfactory. No longer is the reader detained while records are withdrawn."(19) Since, however, the original call card has to be withdrawn sooner or later, anyway, and since—especially with the single-file arrangement made possible by the marginal punched card system (and likewise by Hood and Lyle's date-tab system)—an assistant should be able to withdraw the original charge in a second, it is difficult to see the advantage, either to the borrower or to the library, of renewing a book by the use of a second call card. With the date tab system, such a procedure is necessary, since a differently numbered tab must be provided for the renewal date (unless the book is being renewed for a whole month); but the limitation of the tab does not apply to a marginal punched card. The original charge is removed from the file, its date-due hole

is covered with a correction strip, and another hole, representing the advanced date, is notched. The redated and renotched card is then ready for the file again.

This is the routine described by Kilgour (with one modification, which has already been mentioned), by Stokes, and by Upchurch;(20) it is known to be the one used at Cornell(21) and at Ohio Wesleyan; and it is undoubtedly the one followed by the majority of circulation departments using marginal punched cards.

Personal reserves.—The system used at Penn State for taking care of personal reserves makes it possible for the borrower to charge the book, when it becomes available, on the same card which he used in applying for the reservation.(22) At Ohio Wesleyan the borrower fills out a notice form (a postal, if it requires mailing), which is sent to him when the book becomes available; and he does not fill out the call card until he gets the book. In this way he has to fill out only one card at a time—a procedure which may spare his patience. (If the borrower, himself, fills out the notice form at Penn State, this fact is not mentioned.) One advantage of the Penn State routine is that when the notice is sent, the library will already have, in the form of the next borrower's reservation, the name and address of the person for whom the book is being held. In the other routine this record must be made by the circulation assistant.

The procedure described by Kilgour provides for the stapling, to the back of the original charge, of the "call slips with which the borrowers (on the waiting list) requested the book."(23) Kilgour has elsewhere used the term, "slip," to refer to the marginal punched call card. However, if he means, in connection with the renewals, that other call cards, unnotched, are fastened to the first one, it is plain that such cards will not drop out during the sorting for overdues.

The master file.---The marginal punched card makes possible not only the combining into one file of the call-number file and the date-due file. By assigning holes to the classifications represented by the other files at the circulation desk, such as the faculty file, the reserve book file, the bindery file, etc., all such files may be consoli-

dated into a single master file, thus providing only one place in which to search for a charge.

Stokes has discussed some of the advantages and some of the disadvantages of maintaining a single file.(24) The tendency, when one central file is not used, is to place all of the active charges in one file and the less active charges in another, so that not more than two files are needed.

Harvard College now has a single file,(25) but formerly maintained an inactive file whose charges were not on marginal punched cards.(26) The fact that some libraries have so many inactive charges may deter them from transferring such charges to marginal punched cards. Where this is the case, the arrangement will present no difficulty as long as the circulation assistants are able to identify the inactive charges readily. That most assistants have trouble, however, in distinguishing between the active charges and many of those which are placed in the inactive file, has led the majority of circulation departments to use marginal punched cards for all of their charges. The more active of the inactive charges, if two files are maintained, can then be kept in the active file.

When the marginal punched card system was introduced at Ohio Wesleyan, the library had several thousand books whose circulation was so inactive that they had been moved to various storage locations. These charges, all represented by conventional book cards, were so dead that it was not thought worthwhile to transfer them to the new "Keysort" cards. Consequently, two files are maintained, one for the books in storage, and the other for all other charges.

At Cornell, "the Union File contains all the permanent, faculty, departmental and other long term loans. Short term loans are kept separately in a shorter charge file."(27) American University maintains separate files for reserve books, faculty loans, and student home-use loans, besides a location file.(28) At Arkansas, "records for all books not in place in the stacks are kept in the location file at the loan desk . . . ."(29) The latter practice is also followed at Illinois, Indiana, New Hampshire, and Simmons.(30)

Brown University, in addition to notching its cards to correspond with the respective locations, also uses differently colored cards. While the card for regular charges has a black strip across the top, the cards for New Books, Desk Reserves, and Shelf Reserves have strips colored green, brown, and blue, respectively. A card with a red strip is used for Lost Books, Replacements, and Reservations.(31) Purdue uses such colored strips on the two long edges of its cards, for similar purposes.

Georgia records its departmental charges on a card which is unprinted except for the marginal coding, and which is just like its regular call card except that it has a black "slug" along the right edge; and the clipped corner, instead of being at the upper right, as is true of the regular call cards, is at the bottom right. These differences make it possible for the two groups of cards to ". . . be filed together or separately and yet be readily selected each from the other."(32).

Ohio Wesleyan and Tennessee both use an unprinted card for their location charges, but the cards are identical with the regular call cards in all other respects. Arizona uses this same type of card, in a "permanent file," to indicate ". . . books of which we have multiple copies," and certain departmental charges. For an unexplained reason, "the card is not punched."(33)

Iowa uses five other cards, besides its regular call card, each with a differently colored edge (similar to those used by Purdue except that they are unprinted), to designate, in addition to the notching, the location of its various charges.

The advantage of the unprinted card, of course, is that it is better suited for charges on which typing is to be done, allowing ample room for the inclusion of rubber-stamp impressions, multiple accession numbers, special notes, etc. (The marginal punched card manufacturer can make available the unprinted cards, at no extra cost, at the same time that the corresponding printed cards are being furnished.)

Room-use charges.—On loans to students, several libraries—Arizona, Harvard College, Indiana, New Mexico, Purdue, and Tulsa—use their call cards for home-use charges only. At Harvard College the student fills out a

conventional paper call slip for "books to be used in the Reading Room." Students at New Mexico fill out a conventional call card. One or the other practice probably prevails in the other four institutions mentioned above.

Penn State uses its regular call card for "Room Use" charges, keeping the cards in a separate file and not punching them, since the books which they represent will be returned before the borrowers leave the library.(34) The Cornell card provides boxes in which the student designates Reading Room use, or Home use. American University notches a specific hole for home-use charges, and, as has been mentioned, maintains an exclusively home-loan file, in addition to three other files.

If the charge for a reading-room-only book is placed in the central file, the assistant can locate it more quickly in case there is a request for the book, but this theoretical advantage is usually more than offset by the practical convenience of an easy charging and discharging routine.

Where statistics are kept on the use of the library, the provision of (and the coding and notching of) a marginal punched card for reading room charges, is, of course, an advantage.

Carrell charges.—Stokes has referred to the use, by a few libraries, of a special form for carrell charges.(35) Cornell and Tennessee employ such forms at present. Brown, Harvard College, and Iowa, where such forms were used at the time of Stokes's article, have presumably given them up. Iowa continues to use a special form but it is not a marginal punched card. The Cornell and Tennessee forms consist of two parts detachable from each other, the upper part corresponding in size and perforations to the regular call card, and the lower portion unperforated. The Cornell procedure is described as follows:

> The stall charge card is filled out by the stall user and the DESK RECORD portion is picked up by the stall checker. The RESERVED portion is placed in the book so that the word RESERVED is clearly observed by any checker. This does not mean that the card is not checked against the book; it is, but it does act as a means of iden-

tification for books which should be in the stall against those which have been left there by some reader who was just browsing.

In order not to confuse the charging record the stall charges are punched in the same way the home use books are charged so that any coding system may be used.(36)

The Reserved portion of the Cornell card (6 inches long) has a slit near the top so that the card may be conveniently hooked over a page of the book to which it refers. The bottom part of the Tennessee form is 10 inches long but may be folded along a pre-creased line to shorten its length by four inches. It thus serves for either tall or short books and is not of inconvenient size for storage in the supply room and at the loan desk.

Location charges.—While still on the subject of location charges, it may be of interest to indicate the practice of the various circulation departments in respect to the different locations which they code on their marginal punched cards. Since the writer has samples of the cards used in all the libraries involved in this study, and since a number of his correspondents have furnished him with their complete codes, it is likely that the list will include most of the location charges which libraries are now using.

It must be understood that some of the classifications referred to below are probably being used by libraries whose names are not listed. In general, however, the information is sufficiently complete to be of use to the interested librarian. (In view of the fact that librarians generally will not be interested in the special location charges —specific reading rooms, specific departments, etc.—of a particular institution, this type of charge has been omitted from consideration.)

Before mentioning the location charges, a few of the "time charges" will be indicated.

Arkansas, Georgia, Illinois, Iowa, North Carolina, Penn State, and Purdue code semester charges or quarter charges (and also summer-session charges), depending upon the length of term at the particular institution. New Hampshire uses an "XT" hole for "extended time," and

Texas College a hole for "indefinite loans." Brown University notches a position for "vacation."

New Hampshire, New Mexico, and Tennessee code for an overdue book, in addition to using the conventional system of notching for due dates.

For convenience the location charges (Fig. 21, p. 99) will be given in alphabetical order. After each classification will be listed the libraries (in abbreviated form) known to be coding such classifications on their cards.

The Cornell and Penn State cards provide for the largest number of direct-code positions available for location charges: Cornell, 27; and Penn State, about 30. Georgia and Illinois have cards which are designed with 2-digit selective-type fields for locations, permitting up to 99 different classifications. At present Ohio Wesleyan is using a double-row 4-hole field to code selectively nine locations, but by using an indirect code, nineteen additional classifications can be made available in the same field.

"Tracing" routines.—In the list of locations given in Figure 21, it is observed that eight different libraries are known to be notching a hole for "missing books." Since the circulation departments at Cornell and North Carolina have set up special techniques for dealing with this particular classification, their routines will be described in detail. At Cornell the procedure is as follows:

> For titles not immediately found and which require further tracing the call card is stamped TRACER and after being checked with the main entry card in the catalog (it is traced either immediately or on the following morning) . . . . If not found, . . . it is coded, filed with the charges, and searched for again according to the code punched on the card. In this way we have a reader's report that the title is being searched should some one else ask for this title, and (the title will) also come up for searching automatically according to the code. After three searches, covering a six-week period, the trace is re-typed and the title is charged and coded MISSING in the Union File.(37)

The North Carolina system varies from the above in sev-

eral respects:

> When a book cannot be located a card is prepared for it and coded TRA-1 (the card at North Carolina has two holes used in connection with books which are being traced: both labeled TRA, and designated "1" and "2"). It is filed in the Union File of charges by call number until such time as the book is found or is declared lost. If declared lost TRA-2 is coded and TRA-1 is repaired and the card is returned to the Union File to remain approximately six months, at which time another careful search is made and if negative, decision is made as to replacement, discard, etc. If the book is to be replaced then TRA-1 and 2 are coded (i. e., hole "1" is notched, in addition to hole "2," which is already notched) and the card returns to the Union File to remain until its replacement is received (by the circulation department). Of course, all records are destroyed if replacement is not made.(38)

At Arizona the cards representing missing books ". . . are needled twice a year for a final search before withdrawing them from the file."(39)

Reports-to-reader forms.—Stokes comments on the extra expense involved in having the back of the call cards imprinted for location reports, etc.(40) The Indiana University Library is the only one, to the writer's knowledge, which goes to this expense, but the service which the extra printing supplies, seems to be a valuable one. A space is provided for the due date (in case a book is charged out), with the note to the borrower: "Ask attendant if you want book reserved." Boxes are included for checking various locations where the borrower is asked to apply for a book not available at the main loan desk; and the assistant also has specific boxes to check for Bindery, Missing, Lost, and

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Footnotes for Figure 21.

*The code is represented by a single position for any book charged to any departmental library.

**"A cheerful location for worn books impossible to bind and mend, which are waiting for replacement." (Letter, dated March 6, 1950, from Thelma Brackett.)

Location Charge	Library
Bindery	Ariz., Ark., Brown, Ga., Iowa, N.H., N. C., O.W.U., Penn State, Simmons, Tenn. (combined with "mending"), Texas College.
Carrell	Ariz., Brown, Cornell, Ill., Iowa ("Graduate Desks, broken down by desk number").
Catalog Dept.	Penn State, Tenn. (combined with Order Dept.).
Departmental Library*	N.C., Simmons, Tenn.
Desk Reserve ("under counter")	Brown, Tenn.
Exhibit	N.H.
Extension Dept.	N.C.
Interlibrary Loan	American U., Ariz., N.H., N.M. (combined with "Extension"), N.C., Simmons, Tenn.
Library Staff	N.C.
Locked Case	Ind.
Mending Room	N.H., N.C., Texas College
Missing	Ariz., Cornell, Iowa ("Lost"), N.C., O.W.U., Penn State, Tenn. (combined with "Lost, being replaced, to be withdrawn, delinquent"), Texas College ("Lost").
Morgue**	N.H.
Reference	Ark., Tenn. (combined with "Documents").
Reserve Book Room	American U., Ariz., Ark., Cornell, Ga., Ind., Iowa, N.H., N.C., O.W.U., Penn State, Simmons, Tenn., Texas College
Seminar	Ind.
Storage	N.H.

Fig. 21.—List of location charges used by circulation departments in their marginal-punched-card central files. (See Footnotes on p. 98)

Faculty Use. Adjacent to the box for "Missing," there is another box in which the borrower may indicate "Search Requested." If the "Faculty Use" box is checked, the borrower is reminded that "any book out longer than two weeks may be recalled. Ask Desk Attendant."

At Cornell the report form is rubber-stamped on the back of the card by the assistant who gives the report. After the rubber-stamp impression has been made, the assistant simply checks the appropriate box.(41)

Tennessee's 6-inch call card provides at the bottom third, on the front, some of the same items as are used by Indiana. Of eight different designations represented by the boxes, six refer to Date Due, Reserve Room, Bindery, Branch Library (with line for its name), "Not Located," and "Held for:" (with space for person's name). Brown University places its borrower report in the upper right corner of the card, using the following classifications: "In Use," "On Reserve," "Requires Search," and "Other." Under the last-named designation the borrower is instructed to "see over," where the necessary details will have been supplied by the assistant.

The lower portions of the call cards in several libraries, instead of being used for the above purpose, are reserved for data regarding renewals or overdue notices. Cornell (where, as indicated above, the location report is given on the back of its call card) uses the front of the card on which to provide space for the date of the book's return (presumably only if overdue); and for indicating first, second, and third notices, "bill," and "paid." Iowa indicates, on its card, places in which to supply the following information: Book Returned, Fine Due, Cost of Book, and Processing Fee.

Penn State uses three lines at the bottom of its card for ". . . the original due date and two possible renewals."(42) The New Hampshire card likewise provides three spaces, for one or the other purpose---renewals or overdue notices.

Statistics on library use.---In general, college and university libraries have no further use for the call card if the book is returned on time. Although only two references to this point will be cited here,(43) the lack of evidence to

the contrary is perhaps sufficient justification for the above observation. The writer's correspondents indicate that no more than the conventional minimum of statistics is usually kept by circulation departments. According to Stokes, "there have been several hints of the possibility of doing studies of borrowers' reading tastes and habits by the use of punched cards, but nothing has yet been published reporting that such studies have actually been made.(44)

Some libraries are handicapped by staffs too small to undertake such studies. The librarian at the University of Tulsa writes as follows: "Since we have an enrolment of over 3000 students and a relatively small library staff we decided that it would not be advisable to keep the detailed records on student and faculty reading that are kept in many college and university libraries. Therefore, we simplified our card as much as possible."(45)

Other libraries may conceive ambitious plans for the obtaining of information on book use, only to have such plans canceled by other considerations. In the Texas College Library, which had designed a marginal punched card providing for the indication, by the student, of the department and course for which the book was to be read, there developed the following situation: "At the time this (marginal punched card) system was introduced, it was anticipated that the numbered holes could be assigned to teaching departments and that studies of use of certain classes of material by certain teaching departments could thereby be facilitated. . . ." Since, however, this library has open stacks, and since the students object to filling out a call card under such an arrangement, "as a concession, we no longer insist upon (their) filling in the 'use-for' block."(46)

American University has been able to implement the purpose which the Texas College Library had to give up. By using three fields, with a capacity for numerically coding up to 799, American University notches its card according to the course for which the student uses the book. The code numbers for the courses are based on an alphabetical list of the instructors, together with the courses which they teach (the courses numbering, at present, 530).(47)

In addition to indicating the instructor and course, the

student checks his college status, the school in which he is enrolled, and whether he is a part-time or a full-time student—all of which information is coded and periodically converted into circulation statistics.(48)

The call cards of several libraries—Cornell, Iowa, New Hampshire, and North Carolina—provide boxes in which students check their college status (undergraduate; graduate student; research assistant; etc.) (see the Iowa card, Plate V, p. 85), but this information does not seem to be coded. Students at Georgia check the call card according to whether they are doing "assigned" or "voluntary" reading, and these categories are notched. There is a space for the indication of the course for which the book is read, but this information is apparently not coded. The holes at the bottom of the card (direct code for college status and indirect code for school) are ". . . normally used for statistical studies. . . ."(49) (However, there is no designated space on the card in which the student supplies his status or school.)

The preliminary design of Ohio Wesleyan's call card provided for the coding of the book's class number (to the decimal point). However, when the decision was made to employ a double-use card, it was thought that the class code could be sacrificed. As cards for discharged books were removed from the central file, they would then be placed in appropriate boxes, in class order, until needed for circulation studies. But the interfiling of the cards became, after a while, such a chore that the staff began to look for a remedy. Fortunately, four holes had been provided at each end of the card as "extras" (see Plate V, p. 85). By utilizing the single, adjacent corner hole, mentally labeling it "4," the 2-hole double row of "extras" was made to serve as the hundreds field (a deep notch could be made at positions 1 and 2, respectively, for "8" and "9"). As has been mentioned earlier, only the outer row of the date-due field is used in this library for coding date due, in order to free the inner row "for another purpose." This purpose, now requiring explanation, is to provide the tens field of the class code. Since the date-due information is notched before the cards go into the central

file and is no longer needed after they come out, and since the class code does not have to be punched until books have been discharged, the use of the inner row never begins until the use of the outer row has ended. Finally, to gain a units field, utilization was made of the outer row of the location section (the inner row would be equally available for the same purpose, but would be less convenient to punch and sort). The fact that location charges are not coded on the cards on which borrower-use statistics are kept, makes possible the use of this field for part of the class code.

The provision in this manner of a purpose for which this particular card was not designed, furnishes an effective illustration of the adaptability and versatility of the marginal punched card.

(The use to which the book-classification data are put, will be described after an examination has been made of the coding for borrowers.)

The call card at Ohio Wesleyan provides for the borrower's signature, local address, designation of college status (by a check mark), and library card number. At the time the call cards were being manufactured, the library was planning to make available a wallet-sized registration card. Before the system could be put into operation, however, it was learned that student identification cards would be issued by the registrar's office, beginning that year. Rather than burden the student with an extra card, the library decided to alter its original plans. Since, however, the identification number on the matriculation card was assigned in serial order, instead of by alphabetical arrangement, or by class, etc.—indicating nothing about the student except that he was officially matriculated—it was not satisfactory for the purposes of the circulation department. Accordingly students were urged to register at the library. Meanwhile there had been assigned to each name in the student directory a number, which, when combined with the first three letters of the student's surname, formed a unique identification number. Starting with the number, "5," for a group of names having a common initial triplet of letters, the numbering was done in intervals

of five, so that ample room would be provided for the insertion, in proper alphabetical sequence, of late registrations, second-semester names, etc.(50) To this number was affixed a second one, to designate the student's class. Thus STA-52 might indicate a sophomore named Stark who was either the only student in school whose surname began with the above letters, or whose given name placed him first among the STA's in alphabetical order. An STA-104 would represent a senior whose name, in the directory, appeared immediately following that of the sophomore referred to above.(51)

When the student registers at the library, this identification number is typed, with a "Bulletin-Type" machine (one having characters a quarter-inch high), on his matriculation card. The use of this number by the student, when he fills out a call card—the assistant always looks at the registration number on the matriculation card, as insurance against inaccuracy—obviates the necessity of his supplying his signature, address, and college status. To the library, however, it makes no difference whether the student spares himself this extra writing or not. In fact, the conventional indication of name and address, etc., is actually a time-saver for the library because no decoding of the registration number is necessary when overdue notices have to be sent. And members of the library staff prefer to have the student use his full name so that they may get better acquainted with him. But the student—especially the one who makes extensive use of the library (and his is likely to be a name familiar to the staff anyway)—appreciates the convenience of being able to charge books and other material by writing not more than three letters and three numbers.

With the information at hand which the student has supplied, the library codes it into the call card. The original intention was to code the first two letters of the borrower's surname by using 26 numbers in each group of the "Borrower" section. When it was realized, however, that the designing of the card for 26 numbers automatically gave it the capacity for 39, this fact was taken into account.

Instead of using the one-for-one arrangement (26 num-

bers) in coding the alphabet, the library exploited the full capacity of the borrower section by using a 39-division alphabetical breakdown.

After consulting the current and several preceding editions of the student directory, the library developed the code shown in Figure 22, in which the numbers designated by asterisks indicate combinations of two letters which may be coded as one. This arrangement makes possible the coding, in many instances, of the third letter of the

1st Letter (or 1st & 2nd Letters)	Code	2nd (or 3rd) Letter	1st Letter (or 1st & 2nd) Letters)	Code	2nd (or 3rd) Letter
A	1	A	ME	21	M
BA	2*		N	22	N
BE	3*		O	23	O
BI	4	B	P	24	P
CA	5*		QU	25*	Q
CE	6	C	R	26	R
D	7	D	SA	27*	
E	8	E	SC	28*	
F	9	F	SE	29	
G	10	G	ST	30*	
HA	11*		SU	31	S
HE	12	H	T	32	T
I	13	I	U-V	33	U
J	14	J	WA	34*	V
K	15	K	WE	35*	W
LA	16*		WH	36*	
LE	17*		WI	37*	X
LI	18	L	WO	38	Y
MC	19*		X-Y-Z	39	Z
MA	20*				

*Indicates that the combination of letters in the left-hand column is to be coded as a unit.

Fig. 22.—Six-position arrangement for coding initial two (and frequently three) letters of surnames.

borrower's name. Thus in coding "Bancroft," the "Ba" would be represented not by 2-1 but by the 2 alone, leaving room for the coding of "n." On the other hand a name like Garner would require the code 10-1 for the letters "Ga"; therefore the third letter of this name could not be coded.

As far as possible, the code was designed so that the number for the second (or third) letter would be identical with the number used for the initial letter. An assistant using the code is soon able to memorize it.

From time to time the circulation department sorts the discharged cards by borrower and class (i. e., college status). In a "Kardex" visible-index file cabinet, the library maintains a card for each student, on which card are posted the number of books charged to the student over a given period. Though the limitations of such statistics are recognized, the over-all record provides valuable information on the use of the library. (See pp. 126-28).

While the call cards are still arranged by the borrower's status, they are sorted according to the Dewey classification, and these statistics are also recorded in the "Kardex" file, which includes a card for each of the thousand classifications, 000 to 999.

In the periodic report on library use, made to the faculty and administration, attention is called to the fact that the library maintains, in the "Kardex" file, a use-record not only of, say, the 810's, 820's, 830's, etc.—the totals of which are given in the report—but also of the 811's, 812's, 813's, etc., the reporting of which would represent too much detail for economical incorporation in a general report. (Also, in the interest of economy, "circulations of less than 10" are omitted from the class listings; but are included in the averages and grand totals.)

From the borrower record in the "Kardex" file, the report indicates the number and per cent of students, by classes (including, under a separate heading, the group making the honor roll), who have not charged any books; those who have charged from 1 to 5 books; those who have charged from 6 to 10; etc.

During semesters in which such detailed statistics may not be required, the collection of such data may be skipped

altogether, or reliable samplings may be taken (for instance, the recording of all the charges for students whose surnames begin with the letters, A to E).

Library registration card.—When the student signs up for his registration number at Ohio Wesleyan, he is invited to fill out a library registration card (see Plate VI). Since this card is filed according to the borrower's name, use of the inner row for selective coding of the name section is not necessary. The outer row provides for coding the name according to a 99-division alphabet, simply to facilitate proper rearrangement of the cards after they have been mixed up. Class, major, native state, vocation, and special interest are all selectively coded.

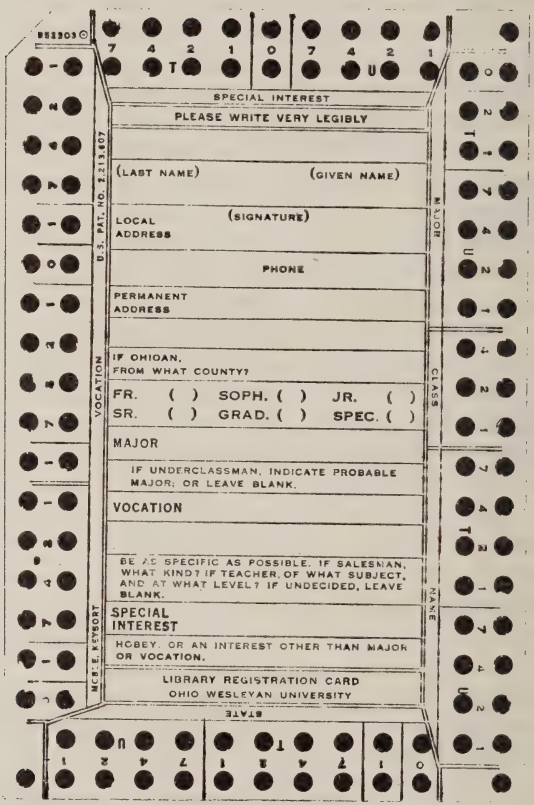
A 19-division alphabet is used to code the first three letters of the student's vocation, reference being made to Occupational Pamphlets, by Gertrude Forrester (H. W. Wilson Co., 1948) and Index to Vocations, 2d ed., by Price and Ticen (H. W. Wilson Co., 1938) for consistency of selections. "Special interest" is coded according to a 99-division alphabet, use being made of the index to Hobbies for Everybody, by Ruth Lampland (Harper, 1934) and also the above-mentioned books, for suggested "see" references, etc. (Other sources for the information referred to here may be found to be more suitable.)

The code for "major" has a capacity for 39 classifications, a sufficient number to permit the inclusion of interdepartmental majors, such as pre-medical, public personnel, etc.

The code for "State," with a capacity of 199, consists of three series of numbers: 1 to 49 for the forty-eight states and the District of Columbia; 50 to 137 for the eighty-eight Ohio counties; and 140 to 178 for foreign countries. In the last-named series the library uses the same 39-division alphabet that is used to code borrowers' names on the call cards, so that where the assistant has memorized the arrangement for one purpose, he may apply it to another. This principle was followed, wherever possible, in the design of all four of the marginal punched cards used in this library.

The information supplied by the registration card has

PLATE VI. A Marginal Punched Registration Card



been available for too short a time for the library to have fully exploited its use. Getting adjusted to the marginal punched card system in general, has taken some of the time which, it is hoped, will later be used in following up the ultimate purposes which the card was designed to serve. (The reference and acquisitions departments are in especially advantageous positions to make use of the registration card.)

Student identification numbers.—There are various practices in connection with the use of student identification numbers. The University of Georgia formerly coded "borrower number" when a charge became overdue(52) (the four selective-coded fields for this purpose take up all except two holes along the right side of the 6-inch card); but the library is ". . . not punching these (now) as this practice did not prove entirely satisfactory. Instead, we use the student's identification card, which proves helpful in verifying signatures."(53)

The situation at Tennessee is as follows: "We do not use a borrower's card nor do we require registration of borrowers, though we may soon find it necessary to recommend an identification card for use throughout the University."(54)

McComb, at Penn State, says, in a letter of April 29, 1949: "One difficulty of our present system is that we have no method for identification of borrowers." Meanwhile this library has ". . . inaugurated a fairly simple system of requiring the presentation of a matriculation card when a student wishes to borrow a book. Faculty members have faculty identification cards. This system seems to be working satisfactorily so that no other machinery seems necessary."(55)

The Galesburg (Ill.) card was designed to accommodate an identification number which was issued to each student by the business office. Based, in general, on the University of Oregon arrangement,(56) the code was designed (1) so that the student's number would correspond to the alphabetical position of his surname; (2) so that he could retain the same number throughout his entire college career; and (3) so that the identification numbers of other students

could be interpolated without disturbing the alphabetical sequence.(57) Contrary to the original plans, however, these numbers rarely were coded into the library's marginal punched cards.(58) (In the above case, the fact that the card was used not as a call card but as a book card—a subject to be treated in a later section of this chapter—would make a serious difference.)

This problem—whether the student should or should not carry some kind of identification number, and, particularly, whether the library should use such a number in connection with its marginal punched card system—depends so much on local conditions that no one solution can be offered.

Faculty loans.—Stokes refers to the techniques for handling faculty loans at Georgia, Harvard College, Indiana, and Penn State.(59) Most of the circulation departments which use marginal punched cards designate a direct-code position for faculty charges. This practice is followed by the American University, Arizona, Arkansas, Cornell, Georgia, Illinois, New Hampshire, New Mexico, North Carolina, Simmons, Tennessee, Texas College, and Tulsa. At Ohio Wesleyan the charge is selectively coded in a double-row field along with the college status of other borrowers.

In addition to using a direct code, Arizona, Arkansas, Illinois, New Hampshire, New Mexico, and Tulsa all employ an alphabetical arrangement for notching the initial letter of the faculty member's surname. These codes vary, in number of holes, from ten, at Arkansas (which uses an arrangement like the one shown in Fig. 3, p. 48), to twenty-six at Illinois. At Tulsa, "in most instances the first letter of the faculty member's name is punched. However, a few faculty members who have a great many books out at one time have been assigned a special code punch."(60)

Iowa, Ohio Wesleyan, and Purdue use indirect coding for faculty charges: Iowa adapting, for this purpose, nine positions labeled for direct coding; Ohio Wesleyan coding, in its borrower section, the initial letters of faculty surnames just as it does for student names; and Purdue using four fields of selective coding, with a capacity of 9,999 for all "staff charges."

At Illinois, where the faculty loans are coded by the initial letter of the instructor's surname, the ". . . end of the semester check-up on faculty charges is accomplished by stages. We pull only enough charges at a time to process during that day. This generally amounts to a group of one, two, or three letters at a time."(61)

Indiana formerly employed a 3-line alphabetical arrangement (Fig. 3) for designating the initial letter of faculty names, but has replaced this system with a different type of record:

> In order to know at a glance what each professor or instructor has out, we keep a duplicate file for faculty—4 x 6 cards, with the name and department of the borrower noted on the top line, and the call numbers, authors, and date borrowed listed below. This is the only deviation from the "one-file" system; it is not essential, but is sufficiently helpful to be worth maintaining.(62)

Elimination of book cards and pockets.—In their evaluation of the advantages of the date-tab system of book charging, Hood and Lyle name, as ". . . most important of all," the fact that "book cards and book pockets are entirely eliminated."(63) This advantage, of course, is one which applies also to the marginal punched card system.

Rogers raises the objection that the system does not ". . . solve the problem of libraries which have thousands of book cards and pockets in their books and which cannot afford to scrap this material and invest in other equipment."(64) The libraries which have adopted the marginal punched card system, however, have not been deterred by this objection. They have chosen rather to emphasize the future savings to be effected by circulating books the processing of which requires only stamping, marking, labeling, and the affixing of date-due slips.

Not only is there a saving in library supplies but also in the time and energy which were once given to the routine of inserting these supplies in the books. The University of New Hampshire, in particular, comments on this point, indicating the increased volume of other work made possible by the elimination of the pockets and book cards.(65)

In the case of books processed before the installation of the marginal punched card system, it is probable that most circulation departments leave the cards in the books. Some libraries, however, like the one at American University, ". . . are eliminating the book cards as fast as the books are put into circulation."(66)

Use of call cards in open-stack libraries.—Jesse and Goehring have pointed out one of the weaknesses of the marginal punched card system—or, for that matter, of any charging system involving the use of call cards or call slips—if the system is to operate in an open-stack library. The borrower, it is claimed, will naturally object to filling out a call card for a book which he himself has obtained from the open shelves. The above authors indicate that the same objection holds true in the case of faculty members, graduate students, and others who have access to otherwise closed stacks.(67)

Recognizing the validity of this argument, but finding the advantages of the marginal punched card system desirable notwithstanding, the library at Ohio Wesleyan took the above objection into account in designing its call card. Mention has already been made of the fact that at this library the borrower may, instead of indicating signature, address, and class, substitute his registration number. In addition to making this concession, the circulation department waived the requirement that the author and title of the book be supplied. Therefore all the student has to write on the call card is the call number and his registration number. (Faculty members may charge books by indicating only their surnames; or, if this procedure is too lengthy—in the case of the steady users of the library—even initials are sufficient.) Since the new system requires less writing than that demanded by the call slip which was a part of the superseded system, there have been no complaints.

Even the borrowers who receive authorless and titleless overdue notices appreciate the fact that the system is a time-saver for them in the long run. The Library of Charlotte and Mecklenburg County, North Carolina, because of the nature of its charging system, also omits author and title information from its overdue notices, and "to our

surprise, the public didn't object."(68)

Since the borrower, at Ohio Wesleyan, is not required to furnish author and title on his call card, the catalog department does not have to type this information in the book as a substitute for the old book card and pocket. The call number is indicated on the library's book plate, which is pasted inside the front cover; and the accession number is stamped just above the date-due slip, which is pasted in a position facing the book plate. Thus the borrower has only to open the front cover of the book in order to secure all the information necessary for charging it.

To eliminate possible waste of the "Keysort" cards, borrowers are requested, by signs near the public catalog, to jot down their call numbers on scratch slips and to fill out the regular call cards in the stacks or at the loan desk, after their books have been obtained; or to retain their "Keysort" cards, filled out for books found to be temporarily unavailable, until the charge can be made. (If a personal reserve is requested, the call card, of course, is taken by the assistant and held, pending the return of the book.)

Hand-written call numbers.—An obvious objection to marginal punched cards, when used as call cards, is that the call numbers must be written in longhand. However, while hand-written call numbers (and whatever other data the library requires for identifying the book) are certainly less desirable than call numbers which have been neatly and accurately typed, there have not arisen the complaints from this source that might have been anticipated.

Jensen, at American University, is hopeful of the outcome when she says, "We have not yet solved the problem of illegible handwriting or incorrect entries, but that will come."(69) Hood and Lyle, whose charging system, in respect to the filling out of the call cards, does not differ from the one under consideration, observe that ". . . there has been no cause for alarm. In no instance has it been impossible to decipher handwriting and the few inaccuracies in call numbers have been solved quickly by consulting the shelf list."(70)

If personal responsibility to check the legibility and ac-

curacy of call numbers is fixed on the assistant, by requiring an appropriate identifying mark on each call card, this problem should be reducible to a size where it would be of no consequence. In any event, as Hood and Lyle, and Kilgour, point out, in connection with their respective systems, errors in filing are never cumulative since all cards are withdrawn when the books which they represent become overdue, regardless of how improperly such charges were filed.(71)

The New Call Card at Harvard College—an Adaptation of the Marginal Punched Card

In the winter of 1949 the Harvard College Library was considering ". . . the possibility of making major changes in the use of . . . (its 'Keysort') cards, or giving them up altogether."(72) After pioneering with a marginal punched call card, and using the Kilgour system (with certain departures from the original setup) for more than ten years, the library adopted, in the spring of 1950, a different type of card.

The new call card, which is 3 1/4 x 4 inches in size, and which is filed, as was its predecessor, according to call number in a central file, has no perforations at all, and hence does not require the use of a sorting needle. A notch is made along the top edge of the card to correspond with one of the letters as shown in the pattern below (the letters are not printed on the card but are shown here simply to indicate the coding arrangement):

A C D E F G

The letters A to G are notched in continuous rotation to designate the respective weeks during which certain classes of books are due.(73) For instance, the schedule in June, 1950, called for the notching of position "B" for 1-week books charged June 5th. Such books would be due June 12th and would be removed from the file (by hand) on June 19th for overdue followup. The same position (i. e.,

"B") would also be notched for "Day" books charged June 12th, since such books would likewise be due June 12th and therefore would likewise be ready for overdue notices after June 19th.(74) The coding and notching system used with this kind of card may be identical with that used with a marginal punched card. The essential difference between the two types of cards is that one is perforated and the other is not.

The following reasons have been given for the shift to the new system on the part of Harvard College:

> 1) We can print our own cards more economically.
> 2) The Keysort system has never saved us as much time as we anticipated, for we have found that what we saved in one respect we lost in another, e. g., making renewals under the Keysort system takes more time and is more of a nuisance.
> 3) Going over the file by hand gives us constant opportunity to do the supremely important job of keeping the file in order.(75)

In answer to Haynes's comments, the following points should be brought out: Statement No. 1 goes unchallenged; plain cards are less expensive than perforated ones. As to Statement No. 2, we have to take Harvard College's word for such an experience, but the testimony of librarians generally is that their marginal punched card system is more efficient than was the superseded system. As for the example which has been chosen—the making of renewals—Harvard's new system does not seem to require the patching up of the original date-due notch. The same procedure could be followed with marginal punched cards, but, whether with the one type of card or with the other, the time saved by not using correction strips must be compensated for by having to sort out from the fallen (or extracted) cards the unwanted ones—the ones still notched at the original due-date position.

The advantage of going over the file by hand (Haynes's Statement No. 3) is not to be slighted, but careful desk work day by day should make such a procedure unnecessary except perhaps on a once-a-quarter or once-a-semester

basis.

Regarding Harvard College's present setup we are reminded that it ". . . is new with us, is more or less in an experimental stage, and we are not ready to make a definite prediction as to how we are going to like it."(76)

The Use of Marginal Punched Cards as "Book Cards"

Stokes has called attention to the use, at the Chicago and Galesburg undergraduate divisions of the University of Illinois, of marginal punched cards as book cards.(77) The card is used exactly as is the conventional book card except that the holes provide, in addition to whatever other classifications are needed, a means of notching for date due. When a book, discharged under this system, is issued to a new borrower, the original due-date hole is patched and the card is then renotched in accordance with the new due date (unless, by long odds, the two due dates should correspond). This system is also used by the libraries of Butler University and the Mayo Clinic,(78) the design of whose cards reduces the odds of date-due correspondence, just mentioned, from about 15 to 1, to 9 to 1 (see Plate VII).

The Galesburg,(79) Chicago, and Mayo cards are all 3 1/4 x 5 in size; the Butler card, 3 x 5. Due dates are indicated at Galesburg and Chicago by an arrangement like the one shown in Figure 1 (p. 47). Overdues are sorted out daily at Galesburg,(80) and "about twice a week" at Chicago.(81) The Butler and Mayo cards provide 3-days-a-week due dates over a 3-week cycle, similar to the coding on many of the call cards which have been described.

The Galesburg and Chicago cards are identical except in two respects: (1) while the former card provides for 19 circulations, the latter card, by adding extra lines for addresses, accommodates only 14 circulations—6 on the front and 8 on the back; (2) at Galesburg, three direct-code holes in "the top row . . . indicate (respectively) whether the book is being used by Staff, (or) whether it is a Reference or Browsing room book."(82) The corresponding holes on the Chicago card are for Reserve, Faculty, and Missing. The holes along the bottom edge of the Galesburg

card are used for the last nine months of the year, January, February, and March being coded in the center holes at the top of the card.(83) All of the holes on the right side (four fields of the 7-4-2-1 arrangement), plus four holes at the top (making the fifth field) were intended to be used for borrower identification numbers, but this plan, as has already been mentioned (pp. 109-10), did not prove to be satisfactory. Maxfield says, "We have never punched or sorted for the . . . (identification) numbers, partly because there is relatively little need, and partly because card savers are cumbersome and appreciably slow up the discharging program."(84)

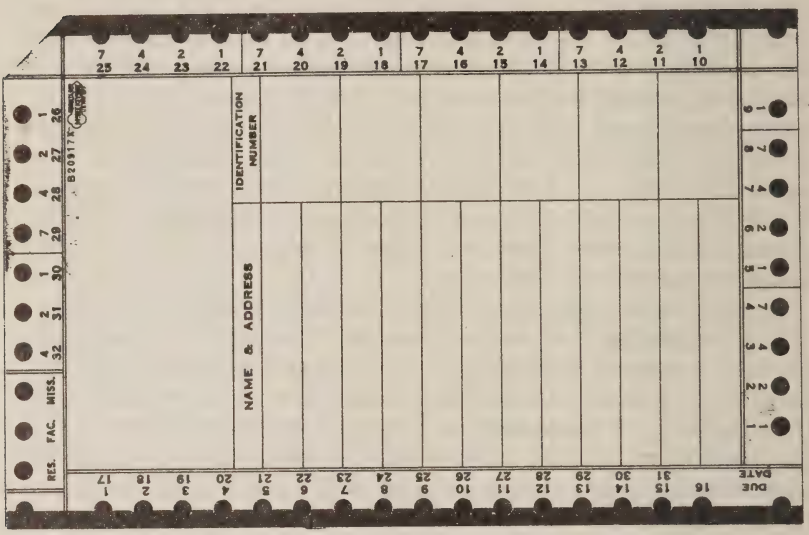
In the above-mentioned interview with Stubblefield, the writer raised questions in connection with (1) the bulkiness of the correction stickers, after the card has been used a number of times; and (2) the obliteration of the codes by the stickers. The answer to the first question was that if the card becomes too bulky with stickers, many of them are torn off, and new ones, providing sufficient coverage but consisting of only one sticker to each unwanted notch, are added. In reply to the second question, Stubblefield indicated that several cards would usually be notched simultaneously; by placing on top of this bunch the card showing the least number of notches, the code could be read satisfactorily.

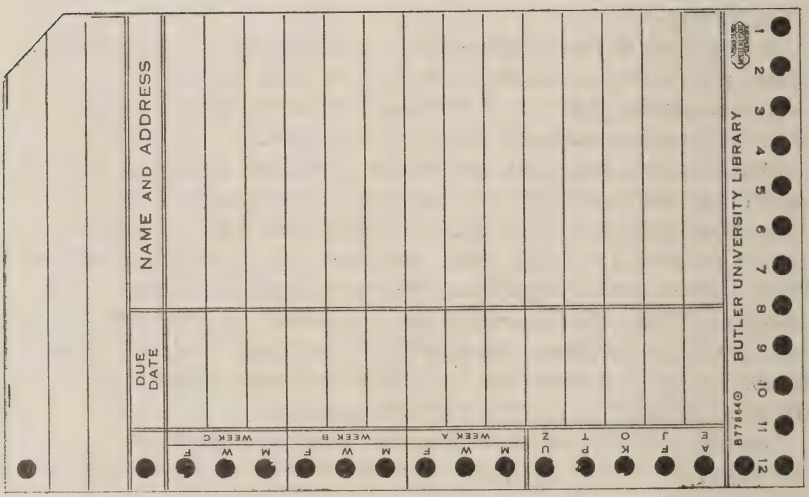
Boisen, at Butler University, observes that "in using a card over and over sometimes there is a little difficulty in superimposing the 'card savers.' Whenever this happens it is a simple matter to retype a new book card."(85)

Mullendore, while on the library staff at the Mayo Clinic, wrote as follows: "We are often asked about our method of changing from one book card form to another. All book cards in the 'out' files were re-typed at one time, and other book cards are re-typed as they circulate from the shelves."(86) (Presumably the borrower is not kept waiting, but signs a blank card which is clipped to the original book card, the necessary information being typed on the blank card at the library's convenience.)

Incidentally, economy-minded librarians who are interested in using marginal punched cards as book cards

PLATE VII. Samples of Marginal Punched Book Cards





may want to exploit a suggestion made by Young. He indicates that "the cards in use can often be converted to this (system) . . . since only the margins are used, leaving the center area undisturbed."(87)

In appraising the system in use at Galesburg, Stubblefield says, "The greatest saving as I see it is that only one circulation record is needed"(88)—a feature not exclusive with this particular application of the marginal punched card. The staff at the Chicago Undergraduate Division feel that the ". . . system compares relatively well with the typical charging systems, but (the staff members) are wondering if it has genuine advantages over the Keysort call card system, or I.B.M., or photo-charging methods."(89)

Simplification of the procedure for the borrower.—At Butler University the object ". . . is to make it as simple as possible for a student to take out books."(90) The marginal punched card which is used in the library, has, in addition to the nine holes along the left edge, which are reserved for due dates, five more holes on the same side, designed to be used for divisions of the alphabet, and twelve direct-code positions at the bottom. In accordance, however, with the library's policy of simplifying loan service, only the holes in the date-due section are being used.(91)

The Butler library has open stacks, and call slips are not required; the borrower has only to get his book and sign his name and address.(92) Since the latter two items of information are contained on only one line of the book card, the card can accommodate up to 31 different charges—14 on the front and 17 on the back.

The circulation system based on the use of the marginal punched card as a book card certainly has the advantage of simplicity as far as the borrower is concerned. Jesse and Goehring have remarked that

> the principal objection to charging systems in use at most university libraries is that they require too much writing on the part of the borrower. Where any very great consideration is given to the reader, it usually has meant a transfer of his work to the staff. Of the two situations the latter is much to be preferred, but neither is very

satisfactory.

The plea of these authors is for a signature-only record except where identification is important.(93)

Boisen voices his desire for the ultimate in simplicity: "If we can discover a photographic or machine charger that will also combine the advantages of the Keysort I think we shall have found the perfect charging system as far as we are concerned, because in that case the student need only present his Identification Card and the book will automatically be charged without any pencil work whatever."(94)

The Use of Marginal Punched "Charging Pockets"

In 1941 Rutherford D. Rogers, with the assistance of Florence L. King, Charles C. Williamson, and Frederick G. Kilgour,(95) developed an ingenious adaptation of the marginal punched card system for use as a method of book charging. The new system was installed in the Columbia College Library, of which Rogers was then Acting Librarian, and the details were later written up for publication in the Library Journal.(96)

As the title of the article indicates, the system involves the use of "charging pockets." Ordinary book pockets were perforated along the bottom edge, and, as books were charged, the book cards would be inserted in the perforated pockets. A couple of staples prevented the card from slipping into the punched area of the pocket. Cards representing books due on the same date would be inserted in like-notched pockets. Notches in certain positions along the 11-hole area at the bottom of the pocket also provided for faculty charges, special locations, etc. Inverting the pockets, an assistant would needle them just as if they were marginal punched cards, and the notched pockets, each containing its card, would drop out.(97)

The system not only eliminates the necessity for a call slip or a call card but adds the further economy of providing for the use, over and over again, of the same pockets. The big advantages of this system over the one in which the marginal punched card is used as a call card, are that the original book cards are used without change (the bor-

rower, in fact, may be totally unaware that a new charging procedure has been introduced), and correction stickers are not needed at all.

Jesse and Goehring have given especially favorable mention to the Rogers system, naming, however, as a disadvantage, in libraries of large circulation, the tripling of the space occupied by the central file.(98)

Unfortunately, from the point of view of the popularity of the method, it was given up by the Columbia College Library in 1943,(99) in favor of the more conventional type of book charging. The chief reason, according to Berthel, for the staff's abandonment of the system was that the equipment, being home-made, eventually reached a state of disrepair which resulted in the dropping out, during the sorting process, of unwanted cards. The principle itself, however, seemed to be regarded as sound.(100)

A modification of the Rogers system.—A modification of the above system which might be considered as having some merit, would be as follows: Instead of using an ordinary book pocket, or one which is similar in type, as the one the pattern of which is shown by Rogers, (101) let us suppose that a specially designed pocket is used. (Since the economy of repeated use is to be enjoyed, an extra initial expense might be justified.) The pocket would be, say, 3 1/2 inches in width, calling, again, for an extra expense—that of securing new filing trays. The front and back of the pocket, along one side, to a depth of almost half-an-inch, would be sealed together, allowing just enough pocket area for a snug-fitting book card.

Instead of boring holes in the charging trays (as was done in the case of the Columbia College installation),(102) and sorting the pockets by inverting the trays, the 3 1/2-inch pockets would be removed from the files in groups, just as marginal punched cards are removed, for sorting with the conventional type of needle.(103) By perforating the long edge of the pocket(104) instead of the short edge, not only can four holes be added (for the coding of other useful classifications) to the eleven which Rogers used, but the pockets, when sorted, cannot lose their cards, because of the snugness of the fit and because of the support of the op-

posite edge of the pocket.

The provision of a pocket 4 inches wide, sealed and perforated on both sides, would, of course, double the coding capacity.

If one of the marginal punched card manufacturers should make available a standard-form pocket of, say, the latter type, perforated with 15 holes on each side (the holes coded for both direct and indirect sorting), a number of libraries might be interested. Simply at the expense of changing their filing trays, and of ordering one or two tumblers and hand slotters and a few thousand marginal punched pockets, they could consolidate all of their files into one, yet continue to require, on the part of the borrower, no more information than is furnished under their present system.

The Reserve Book Room

As was indicated in Figure 22 (p. 105), at least fourteen different libraries use a position on their marginal punched cards to designate reserve books. New Hampshire also notches for uncataloged duplicates purchased for reserve room use.(105)

The Standing File

A file of all books on reserve is maintained by the reserve book room at Tennessee, on the same type of card as is used at the main loan desk (with blank center) for location charges. For "one-week reserves," which are kept in a file separate from the other reserve book charges, the borrower uses the printed call card.

In addition to coding several special classifications, the reserve room in this library notches for overnight reserves, vertical file and uncataloged material, personal copies belonging to faculty members and departments, periodicals, and books belonging to branch libraries. It also has a code for each of the four quarters of the school year.(106)

Although adoption of the marginal punched card system at Penn State resulted in the elimination of book cards and pockets, Stokes mentions that books for the reserve room

are processed by adding this equipment to them.(107) Nothing further is said, however, about the reserve room system, since it was not until the spring of 1949 that a specially prepared card was introduced into this department.

The reserve book room at Penn State contains some 3,000 books, the cards for which are arranged alphabetically by author. Since the files at the main loan desk are arranged by class number, the reserve room cards must be completely rearranged for each inventory.

Fortunately, a very economical method was worked out for reducing the great amount of labor which such rearrangement entailed. The discharged call cards from the main loan desk were found to be usable for this purpose. The left-hand sides of the call cards were trimmed off so that they could be accommodated in the reserve room's filing trays, which were designed for 3 x 5 cards. Since the untrimmed edge and the bottom edge, being used at the main loan desk chiefly for location charges, had their holes still intact on the discharged call cards, these holes could be made available for the reserve room's coding.

The call number, author, title, and other necessary information were transferred from the cards in the old reserve file to the backs of the discharged "Keysort" cards, and a master card was made up to indicate the classifications to be notched. Eight of the holes at the bottom of the card, plus four along the left edge (the reserve card's left edge) were assigned to the main divisions of the Dewey classification and subdivisions of the 300's and 900's, to arrange the reserve room file for inventory. And the remaining sixteen positions on the left side were used for re-sorting the cards into alphabetical sequence. The tenth hole at the bottom was notched if the book was an instructor's personal copy.

The memorandum from which the above information has been taken, concludes by indicating that "if there were more holes available, there is the possibility that certain courses with a large number of books reserved could have assigned holes . . . ."(108)

The only other institutions, besides Penn State, which use specially designed cards in their reserve book rooms, are Ohio Wesleyan, where the special form is used as a call card, and the University of Toronto, where the form serves as a "transaction" card (to be described on pp. 129-134). The dimensions of the Ohio Wesleyan card are the same as those of the library's regular call card (3 1/4 x 5), and the former card, like the latter, serves for two circulations; but the cards are printed with differently colored inks, and are differently designed.

Books in the reserve room at Ohio Wesleyan are on closed shelves and are arranged by department, then by instructor, then by author and title. Because of this arrangement the student is asked to call for the reserve book by supplying the above classifications on the call card. In addition, he furnishes signature and address, and checks his college status.

The requesting, by the library, of seven different items of information on reserve book charges would be unforgivable were it not for the fact that the system provides for several short cuts. In listing all the faculty members, together with their respective departments, the library found that in only nine instances would there be a possible complication if only the first two letters of the instructor's surname and the first two letters of his department were used on the call card. Seven of these instances were accounted for by the correspondence of the two initial letters in the departments of Spanish and Speech, Geology and German, and Philosophy, Physical Education, and Physics. But the reserve room assistants, by being posted as to these few exceptions to the system, watch for possible complications and request additional information from the student if necessary.

Instead, then, of having to write out, under department and instructor, Fine Arts—Stewart, Political Science—Strachan, Physical Education—Strimer, or Zoology—Stull, the student is required to supply only "Fi," "Po," "P.E.," or "Zo," respectively, along with, in each of these cases,

"St." Even where the letters of two or more departments correspond, the fact that the instructors in one of the departments have initial letters which are not duplicated by the initial letters of the instructors in the other department (or departments), makes it possible to use only the 4-letter combination.

On the author and title lines of the reserve room call card, the student needs to furnish only the briefest information: the surname of the author and only a few words of the title. For books in great demand, the authors and titles of which have become especially familiar to both the borrower and to the assistant, the name of the author alone may be sufficient on the call card.

Finally, in respect to the signature, address, and class, the same time-saving service is available to reserve room users as is available to students charging books at the main loan desk: the borrower's registration number may be substituted for the three items named. Actually, then, instead of requiring a burdensome amount of writing, the reserve room card demands, in addition to the author and title information, only seven letters and two or three numerals.

At the time the assistant gives a reserve book to a student, the assistant indicates on the call card the first three numbers of the Dewey classification; the copy number if necessary; and the time or date due. In order not to slow up the lending process, none of the coding is done until after the borrower receives his book, and most of it is delayed till after the book has been discharged. Then the name of the borrower, his college status, and the call number of the book are notched into the card. The borrower code is like the one used at the main loan desk (Fig. 22, p. 105), except that only a single row of holes is used, since selective sorting of this section was not thought to be necessary in the reserve room. The "class" section, of six double-row holes, accommodates the coding of graduate and special students in addition to the four undergraduate classes. Faculty, Bindery, Missing, and a few other charges are designated in the location section. The call number is notched, in a single-row section, according to the conventional 7-4-2-1 pattern.

Statistics on Reserve Room Use

At the end of each semester the reserve room furnishes to each instructor a list of all the books which he has had on reserve, indicating the author, title, number of copies, "period" (i.e., whether the book has been on reserve for 1-, 2-, or 3-hour loans, or for 1-, 2-, or 3-day loans), and number of circulations. The preparation of this report is facilitated by the filing of each card, after it has been notched, under the name of the appropriate department and instructor, in conveniently located trays. The arrangement of the cards by author (providing the instructors with an indexing plan which they prefer to the Dewey order) is achieved, with the aid of a Gaylord "Alphabetizer," in less time than would be required to type the call numbers on the reports.

When the reports have been completed, the cards are ready to be sorted for the general library statistics. (The sorting is done by whichever assistants—in either the reserve room or at the main loan desk—can be most conveniently spared for the purpose. This is one of the occasions, incidentally, when every sorting needle is put to effective use.)

In the general report on library use, the reserve room statistics are included, although separately listed, along with those of the main loan desk, indicating the number of books circulated in each classification, the number and per cent of students not using the reserve room, etc.

In the "Report on Library Use—First Semester, '48-49,"(109) the following paragraphs, applying to both the main loan desk and to the reserve book room, were brought to the attention of the faculty and administration. (While this material has no direct connection with the marginal punched card system, it must be borne in mind that the real aims of the library, toward which any kind of charging system would be oriented, cannot be realized unless there is made available the information by which the services of the library can be appraised. Although the marginal punched card system can greatly facilitate the accumulation of this information, and although the system can

streamline the charging procedure and provide more efficient service generally, these advantages must all be considered in the light of the educational purposes of the whole institution. It was in this light that the following material was originally prepared, and it is in this light that it is being referred to here.)

Although "a quantitative evaluation of library activity . . . (constitutes) probably the best single available index of the library's educational achievement,"(110) we are quite ready to admit that we have "little assurance that the quality of service is proportional to the quantity of circulation. Circulation data tell nothing about how many of the books lent were returned unread, about how many different students may have read a given book while it was charged to one student, or about the quality of the materials read—still less about the effect which reading a given book, or any number of books, may have had upon any student or students."(111)

While it is true, however, that the qualitative aspects of library use defy measurement, and that quantitative analyses, in themselves, are often meaningless, we are under an educational obligation to make the most of the statistics which are available to us. From such statistics "the administrator will be able to form judgments concerning teaching methods and the skill of instructors; the college dean will be able to account for certain failures among the students due to neglect of reading, and will have also a new means of appraising the effect of the work of the college on individuals. The instructor himself will find it possible by means of the reading records of his students, considered in conjunction with their class work, to come to conclusions concerning the values of different types of reading materials. Finally, the librarian . . . will be enabled to appraise the effects of his own efforts . . . in increasing the reading done by students."(112)

"Records of books read for various purposes and records of the number of times books in different classes are read by students are a proper measure of the 'live-

ness' of the book collection. Books purchased and not used are evidence either of poor book selection or improper or failing incentives to library use. If all the reading done from the college library is done in a comparatively small proportion of its books, something is wrong either with the character of the remainder of the collection or with the teaching methods of the college, which fail to bring about its use. It is important for the librarian and the other members of the college staff to know these things."(113)

Personal Reserves

Returning to the discussion of the reserve room procedure, examination will now be made of the routine for taking care of personal reserves. (Such "saves," at Ohio Wesleyan, may be arranged for up to a week in advance.) Since the marginal punched card system had eliminated the book cards and pockets, which had been utilized in connection with the saves, the reserve room was confronted with a problem. The following technique was devised, however, as a solution. (The routine below was developed by the writer after consultation with the reserve room staff.)

Student presents green (reserve room) card, always giving library card number (reservations are not acceptable otherwise). Attendant checks to see that the particular book will be available at the time wanted.

Attendant notes copy number on green card, and also, on the blank signature line (the registration number goes on a line to itself), the date and time of reservation. On date-due slip, in red pencil, the student's card number is written, and under this, the time and date of reservation.

Green card is returned to student, for presentation later. Book is returned to shelf, from which it may circulate until time of reservation.

Since all date and time dues are shown in black pencil, the reservations in red pencil stand out conspicuously and can be taken in at a glance whenever the book is charged.

The "Transaction" Card

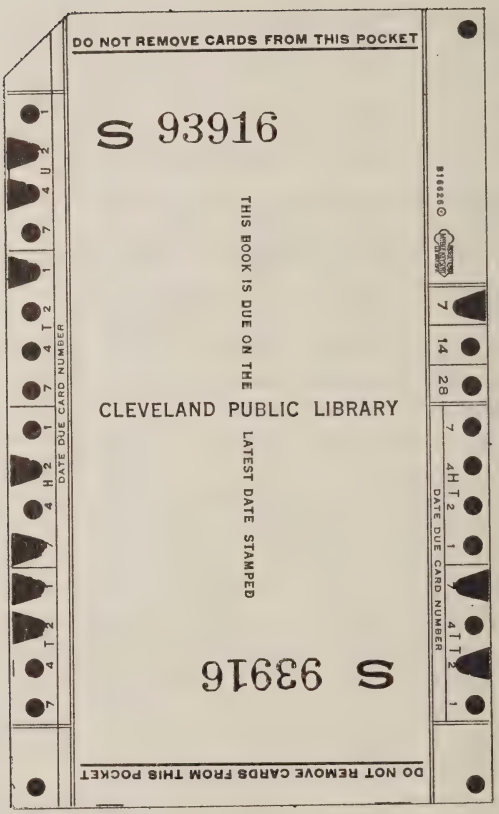
At the main loan desk of college and university libraries it is essential to provide, for convenient reference, a record showing to whom books have been charged and when such books are due. But whereas loans of a week or longer demand this kind of record, overnight reserves do not. Since, in most cases, overnight loans are made only a short time before the library closes, and are due back within a very short time after the library reopens on the following school day, the record of the charge, while necessary, of course, need not be one which is easily accessible while the books are in circulation. This being the case, a number of reserve rooms are using a system which does not require the conventional author or class file.

The principle underlying the new procedure was developed by Shaw in connection with the charging system at the Gary, Indiana, Public Library.(114) As applied to overnight reserve books, the principle can be briefly illustrated by describing the charging and discharging routine.

The student fills out a regular call card and presents it, along with the book, to the assistant. The assistant has a group of "transaction" cards (see Plate VIII)—enough to accommodate all the charges that will be made on this date —which are serially numbered. The number of the first transaction card is written on the call card; the former card is placed in the book pocket; and the call card is retained. The next book is charged by assigning to it the succeeding transaction number, and the call card for this book is filed behind that of the first. The library, then, soon has a file of call cards arranged in the order in which the books were charged, which arrangement also corresponds to the serial numbers on the transaction cards.

When the overnight books are returned the following morning, the transaction cards are withdrawn from the pockets, and the books are ready for shelving or for the next borrower. (Note is made, of course, of books which are returned late.) At the library's convenience the returned transaction cards are arranged by serial number. If cards No. 18 and No. 43, say, are missing, the file of

PLATE VIII. A "Transaction" Card


DO NOT REMOVE CARDS FROM THIS POCKET
S 93916
THIS BOOK IS DUE ON THE
CLEVELAND PUBLIC LIBRARY
LATEST DATE STAMPED
DATE DUE CARD NUMBER
7 14 28
DO NOT REMOVE CARDS FROM THIS POCKET

call cards is consulted and the cards with the corresponding numbers are pulled out for overdue follow-up.

This is the system that makes it possible for books to "automatically discharge themselves"(115)—a system especially attractive to the reserve room, since large numbers of its books are often returned at about the same time, and since (especially just preceding the weeks for "mid-terms" and final examinations) there may be students already waiting for the returned books.

Of all the public libraries (eleven in number) known to the writer to be using marginal punched cards, eight of them—Charlotte; Cleveland; Gary; Glendale; Mill Valley (Calif.); Porterville (Calif.); Sacramento; and San Bernardino—are using the cards as transaction cards, in connection with their regular loans.(116) Mill Valley and Porterville use a homemade system employing call slips,(117) and the other public libraries (i. e., those using transaction cards) with one exception, charge their books by the photographic process.(118) The exception refers to the Charlotte Public Library, which uses an "audio charge" arrangement.(119)

Although a number of college and university libraries are using the transaction-card system in their reserve rooms, the writer has heard of only one instance in which marginal punched cards are used with the system.(120) The University of Toronto Library employs a "Keysort" card 3 1/4 x 4 1/2 inches in size and follows essentially the same routine as is described on pages 129-131. A chief difference in the two procedures lies in the practice at Toronto of maintaining the call-slip file by call number (or possibly by author) instead of by serial number—a method which permits an easy check to determine the location of charges, but which, of course, slows up the process of matching the transaction numbers of overdue books for follow-up purposes.

As was indicated earlier, the University of Toronto formerly used a geometric-progression arrangement for coding its transaction numbers, but has recently adopted the 7-4-2-1 pattern. Several different decks of transaction cards are used "in order that serial numbers might be as

small as possible and cards for different days be easily distinguishable . . . ."(121) These decks are differently colored as well as being differently coded, for convenient sorting one from another in case the transaction cards from two or more decks become mixed up.(122)

Several statements relating to the reserve room setup at Toronto will be of interest to prospective users of such a system:

> . . . the cards paid for themselves, in time saved ("about ten hours a week"), during the first three months of use. . . .
>
> The cards . . . show so little wear after four months of use that we think they may not have to be replaced for two or three years.
>
> The unexpected but noticeable decline in the number of "snags" . . . has meant an additional saving of time and worry.
>
> Loss and mutilation of cards, which we worried about at the beginning, have not been problems: at the end of the fall term, after a total overnight circulation of 23,769, there were only six cards lost and only two that had not been accounted for.(123)

The distinctive feature of the Toronto system is found in the method by which missing transaction cards are detected. If a certain card, representing an overdue book, is not accounted for after the cards have been serially sorted, its absence from the deck is not discovered by actual examination of all the cards, in turn, as is the orthodox practice in the case of non-machine-type transaction cards. Instead, the University of Toronto Library devised a special technique—illustrated in Figure 3 of the article which has been cited—whereby the left-hand margin of its card is printed in black ink, and the cards are notched along this unperforated edge in such a manner as to expose, by jogs in the otherwise solid black line, any missing cards. With this system it is possible for the library assistant to note missing numbers by glancing at the edges of the cards ten at a

time instead of by having to look at each card separately.

Since a number of readers will not have access to the Canadian Library Association Bulletin, and will doubtless be curious as to just how the above system operates, such readers may be interested in designing a small deck of cards which will show the basic principle of the Toronto device. The directions, as given below, can be carried out completely in only a few minutes:

On one of the short edges of a 3 x 5-inch card, of white or light-colored stock, set off 9/16-inch left and right margins and connect these two marginal lines with a line an 1/8 inch from the edge and running parallel with the edge. This line will be 30/16 inches long and will therefore conveniently provide for ten units of 3/16 inches each. With a pair of scissors, cut along the right-hand marginal line to the parallel line, then along the parallel line to within 3/16 inches of the left-hand margin, and then perpendicularly to the short edge of the card. Such operations will result in a card having two 1/8-inch long projections, the right-hand projection being 9/16 inches wide and the left-hand projection being 3/4 inches wide (9/16 + 3/16), and a 27/16-inch cut-out space between the projections. This will be card "O." Card No. 1 will be cut in the same way except that its left-hand margin will be 3/16 inches wider. Card No. 2 will have a left-hand margin 3/16 inches wider than that of card No. 1, and so on. Card No. 8 will have a notch only 3/16 inches wide, and card No. 9 will not have to be cut at all.

If the ten cards are now placed in order, the resultant pattern will be seen to be of such a type that any missing cards are readily noted. The detection of missing cards is made much easier and faster, however, if, while the complete deck is held in proper order, the entire patterned edge is pencilled in. In other words each card will have a black spot of 1/8 x 3/16 inches at the right hand edge of its left-hand margin. With this arrangement any card missing from the deck will show up as a white spot in the otherwise solid black line, and hence call itself immediately to the attention of the library assistant.

In actual practice the numbers 0 - 9 will correspond with

the units field of the marginal-punched portion of the cards, and each series of the specially cut cards will automatically fall into its proper order (as will all the cards within the series) as the cards are needled for sequence sorting.

Blackburn writes, regarding the device used at Toronto, that after working out a system such as the one described above, "we discover that Copeland-Chatterson of Brampton, Ontario (agents for "Kwiksort" cards) . . . have a machine that makes a similar cut; and we may order our next cards from them."(124)

It is expected that the marginal-punched transaction-card system will become more widely adopted by academic institutions. The fact that the same cards can be used repeatedly—hence the economy to be effected by purchasing them in rather small quantities—is one of the advantages to be noted. Another advantage—the simplicity of the transaction card's design—makes unnecessary the purchase of a specially prepared form. In fact, the new card (Form Y16) produced by the Hadley Company would fit the requirements very satisfactorily.(125) Its 3 x 5 size permits it to be inserted in the book pocket, and to be accommodated by standard filing trays; its unprinted center area provides plenty of space for writing, typing, or stamping the serial number (and also for rubber-stamping instructions to the borrower regarding time due, schedule of fines, etc.); and its coding arrangement would make it easy for any assistant to notch the card to correspond with the serial number.

When the speedy missing-number detection system used by the University of Toronto Library is added to the card's design, the system should find increasingly greater favor.

FOOTNOTES

1. Dated Aug. 30, 1949.
2. Letter, dated March 8, 1950, from Anne Jensen. In addition to introducing the new call card to the faculty members, the mimeographed material also referred to two other marginal punched cards used at this university: the order card, and a card used in connection with a special service available to American University through the Library of Congress.

3. Kilgour, Frederick G. "A New Punched Card for Circulation Records." Library Journal 64: 131, Feb. 15, 1939.

4. Books due on Saturday and Monday are both coded "M"; those due on Tuesday and Wednesday are both coded "W"; etc. The first weekly period is arbitrarily made to correspond with a given week of the school calendar, and the three periods then rotate throughout the year, the first period following the third, etc.

5. Letter, dated April 26, 1949, from Helen Hefling.

6. Letter, dated July 19, 1949, from Luanna H. Stahlecker.

7. Stokes mentions that Harvard College, where formerly the three-days-a-week arrangement was used, has changed to the one-day-a-week due-date system. (Stokes, Katharine M. "A Librarian Looks at Keysort." Library Journal 72: 953, June 15, 1947). Young says the once-a-week method ". . . has merit regardless of the charging system used." (Young, George B. "Borrower Merely Signs His Name." Library Journal 74: 13, Jan. 1, 1949.)

8. Letter, dated March 17, 1950, from Lois Smith.

9. Letter, dated Dec. 3, 1949, from N. S. Boardman.

10. Ibid.

11. Books in this library are due, as at Arizona, Indiana, Harvard College, etc., on only one day a week.

12. Letter, dated May 12, 1949.

13. Letter, dated Jan. 10, 1950, from George F. Bentley.

14. Such clips are available from the library supply companies.

15. Letter, dated March 8, 1948, from Marian Mullendore (then Circulation Librarian) to Janet Doe, of the New York Academy of Medicine.

16. This library changed from the 3 x 5 size in the fall of 1949. (Letter, dated April 28, 1949, from Helen Thompson.)

17. On Brown University's card this space is in the middle with perforations above and below.

18. The omission of author and title information will be discussed later (pp. 112-113).

19. Hood, Marjorie, and Guy R. Lyle. "A New System of Book Charging for College Libraries." Library Journal 65: 19, Jan. 1, 1940.

20 Kilgour. Op. cit., p. 133; Stokes. Op. cit., p. 899, June 1, 1947; Upchurch, Grace. "Punched Cards for Circulation Records." Arkansas Libraries 5: 8, October 1948.

21. Letter, dated May 12, 1949, from Wilfred Laurier Morin.

22. Stokes. Loc. cit.

23. Kilgour. Loc. cit.

24. Stokes. Op. cit., p. 953, June 15, 1947.
25. Stokes. Loc. cit.
26. Kilgour. Op. cit., p. 114.
27. Letter, dated May 12, 1949, from Wilfred Laurier Morin.
28. Letter, dated March 8, 1950, from Anne Jensen.
29. Upchurch. Op. cit., p. 8.
30. Letter, dated May 3, 1949, from Wayne S. Yenawine; letter, dated Dec. 3, 1949, from N. S. Boardman; letter, dated March 6, 1950, from Thelma Brackett; letter, dated March 16, 1950, from Margaret J. Arnold.
31. Letter, dated April 28, 1949, from Helen Thompson.
32. Letter, dated April 30, 1949, from Evelyn Fritz.
33. Letter, dated March 17, 1950, from Lois Smith.
34. Stokes, Op. cit., p. 899, June 1, 1947.
35. Stokes. Op. cit., p. 954, June 15, 1947.
36. Letter, dated May 12, 1949, from Wilfred Laurier Morin.
37. Letter, dated May 12, 1949, from Wilfred Laurier Morin.
38. Letter, dated May 12, 1949, from George F. Bentley.
39. Letter, dated March 17, 1950, from Lois Smith.
40. Stokes. Op. cit., p. 900, June 1, 1947.
41. Morin (Letter). Op. cit.
42. Stokes. Op. cit., p. 900, June 1, 1947.
43. Hood and Lyle. Op. cit., p. 28; Kilgour. Op. cit., p. 115.
44. Stokes, Katherine (sic) M. "Library Applications of Punched Card Systems." Special Libraries 38: 207, September 1947.
45. Letter, dated April 30, 1949, from Eugenia Maddox.
46. Letter, dated March 28, 1950, from Fred H. Graves.
47. Letter, dated March 8, 1950, from Anne Jensen.
48. When the cards are used for charging "maps and records," "slides and films," and "equipment," such classifications are coded and their circulations recorded separately.
49. Letter, dated April 30, 1949, from Evelyn Fritz.
50. In case of rather long runs of names having the same initial letters, the 5-place interval is changed to one of 4, 3, or 2, as required, so that no registration number, exclusive of the class designation, exceeds two digits.
51. For purposes of illustration, a list of hypothetical names is shown below, along with the registration symbols which would be assigned to them. The parenthetical num-

ber refers to the student's class.

Stark (2)	STA-52	Stevens, Anna (3)	STE-353
Stauffer (4)	STA-104	Stevens, Charles (1)	STE-401
Stearns (3)	STE-53	Stewart (2)	STE-452
Steele (2)	STE-102	Stimpson (3)	STI-53
Stein (1)	STE-151	Stockley (1)	STO-51
Stephens, Ruth (4)	STE-204	Stoddard (4)	STO-104
Stephens, Warren (1)	STE-251	Stone (4)	STO-154
Stephenson (2)	STE-302	Stroud (2)	STR-52

52. Stokes. "A Librarian Looks at Keysort." Op cit., pp. 900, 911, 954, June 1 and 15, 1947.
53. Letter, dated April 30, 1949, from Evelyn Fritz.
54. Letter, dated April 26, 1949, from A. L. McNeal.
55. Letter, dated March 18, 1950, from Ralph W. McComb.
56. Baehne, G. W., ed. Practical Applications of the Punched Card Method in Colleges and Universities. New York, Columbia University Press, 1935, pp. 63, 67-90.
57. Letter, dated June 10, 1949, from Louise Stubblefield; letter, dated March 2, 1950, from William J. English, former business manager of the Galesburg Division.
58. Interview, Feb. 10, 1950, with Louise Stubblefield.
59. Stokes. "A Librarian Looks at Keysort." Op. cit., pp. 911, 953-54.
60. Letter, dated April 30, 1949, from Eugenia Maddox.
61. Letter, dated May 3, 1949, from Wayne S. Yenawine.
62. Letter, dated Dec. 3, 1949, from N. S. Boardman.
63. Hood and Lyle. Op. cit., p. 20.
64. Rogers, Rutherford D. "A Charging Pocket Solution for Overdues." Library Journal 66: 1072, Dec. 15, 1941. The fact that the Columbia College Library had, not long before the Rogers' charging method was put into operation, just finished supplying all its books with the conventional charging equipment, was an effective inducement to the library to eliminate from consideration any system which would not make use of this equipment. (Interview, Feb. 14, 1950, with John H. Berthel, Librarian, Butler Library, Columbia University; Rogers. Loc. cit.)
65. Letter, dated March 6, 1950, from Thelma Brackett.
66. Letter, dated March 8, 1950, from Anne Jensen.
67. Jesse, William H., and Eleanor E. Goehring. "University Library Charging Systems." College and Research Libraries 6: 52, December 1944.
68. Galvin, Hoyt R. "Charging System for Public Libraries." (Mimeographed.) p. 3. (Made available to the writer

through the courtesy of the author.)

69. Letter, dated March 8, 1950.

70 Hood and Lyle. Op. cit., p. 20.

71. Hood and Lyle. Loc. cit.; Kilgour. Op. cit., p. 115.

72. Letter, dated Dec. 12, 1949, from K. D. Metcalf.

73. It is interesting to compare Harvard's date-notch call card with its seven positions across the top of a 3 1/4-inch card, with Hood and Lyle's date-tab call card (Hood and Lyle. Op. cit.), with its six positions across the top of a 3-inch card.

74. Letter, dated May 20, 1950, from Morrison C. Haviland; letter, dated June 23, 1950, from Robert H. Haynes.

75. Haynes (Letter). Op. cit.

76. Ibid.

77. Stokes. "A Librarian Looks at Keysort." Op. cit., pp. 954, 955, June 15, 1947.

78. Since an article on the use of the marginal punched card system in the Mayo Clinic Library is scheduled for publication in the July, 1950, issue of the Bulletin of the Medical Library Association, only brief references to this library are being made in the present report. (Letter, dated Feb. 11, 1950, from Thomas E. Keys; letter, dated March 28, 1950, from Estelle Brodman, Librarian, Army Medical Library.)

79. Despite the fact that the Galesburg division has been closed (see footnote No. 2, p. 176), the present tense will be used in this description for the sake of simplicity of presentation.

80. Letter, dated June 2, 1949, from Louise Stubblefield.

81. Letter, dated March 13, 1950, from David K. Maxfield.

82. Stubblefield (Letter). Op. cit.

83. Interview, Feb. 10, 1950, with Louise Stubblefield.

84. Letter, dated March 13, 1950

85. Letter, dated April 27, 1949.

86. Letter, dated March 8, 1948, from Marian Mullendore (then Circulation Librarian) to Janet Doe, of the New York Academy of Medicine.

87. Young, George G. "Library Uses of the Marginal Punched Card." California Library Association Bulletin 8: 96, March 1947.

88. Letter, dated June 2, 1949.

89. Letter, dated March 13, 1950, from David K. Maxfield. (His underscoring.)

90. Letter, dated April 27, 1949, from Harold L. Boisen.

91. Ibid.

92. Ibid.
93. Jesse and Goehring. Op. cit., p. 51.
94. Letter, dated April 27, 1949.
95. The Kilgour system at Harvard College was installed in 1938. (Kilgour. Op. cit., p. 133.)
96. Rogers. Op. cit.
97. A third staple, in addition to the two mentioned above, prevented the card from falling out of the pocket, but did not interfere with its insertion or withdrawal by the desk assistant.
98. Jesse and Goehring. Op. cit., pp. 52-53.
99. No other libraries, to the writer's knowledge, have adopted the system.
100. Interview, Feb. 14, 1950, with John H. Berthel, Librarian, Butler Library, Columbia University.
101. Op. cit., p. 1071.
102. The expense of providing trays of sufficient width to accommodate 3 1/2-inch pockets would probably be little more, and perhaps even less, than the expense of adapting the library's present trays for use with the Rogers system.
103. This feature would answer one possible objection to the Rogers system; that is, the dislike which many women assistants would have, of handling the heavy charging trays.
104. A pocket 4 inches long on the front side and, say, 4 1/2 inches long on the back side (for easy insertion of the card), would permit the top end of the card to protrude sufficiently for its convenient consultation and/or withdrawal.
104-A. The writer has recently learned that Superior Business Machines, Inc., 307 Fifth Ave., New York 16, N. Y., has put on the market a machine which will readily change an ordinary file card into a marginal punched card. Since "any kind, size or thickness of card stock . . . may be used," there is no reason why a card pocket can not be treated in the same way as a card. The "Flexisort" System, which necessitates the use of a specially patented key punch, rentable at the rate of $25 per month, uses the conventional 7-4-2-1 coding arrangement (with perforations five to the inch), but here the resemblance to other marginal punched card systems leaves off. Librarians in institutions which are interested in, and can afford, this type of equipment, should investigate the unique features of the "Flexisort" Punch, which is illustrated and described in literature available on request from the company. (The system naturally does not make possible direct reading of coded information from the individual card, nor does it provide economically for utilization of maximum coding

capacity as in the case of a card all four edges of which are pre-perforated.)

105. Letter, dated March 6, 1950, from Thelma Brackett.

106. Letter, dated April 26, 1949, from A. L. McNeal.

107. Stokes. "A Librarian Looks at Keysort." Op. cit., p. 899, June 1, 1947.

108. Unsigned and undated memo prepared at the request of Ralph W. McComb, in answer to the writer's inquiry. Covering letter, from McComb, dated April 29, 1949.

109. Ohio Wesleyan University. The Library. "Report . . . ." (Mimeographed) p. 9.

110. Waples, Douglas. The Library. Vol. 4 of the North Central Association of Colleges and Secondary Schools. The Evaluation of Higher Institutions. Chicago, University of Chicago Press, 1936, p. 40.

111. Coney, Donald, and others. A Survey of the Indiana University Library. Chicago, American Library Association, 1940, p. 62.

112. Randall, William M., and Francis L. D. Goodrich. Principles of College Library Administration, 2d ed. Chicago, A.L.A. and University of Chicago Press, 1941, p. 232.

113. Ibid., p. 233.

114. Shaw, Ralph R. "Reducing the Cost of the Lending Process." ALA Bulletin 35: 504+, Oct. 1, 1941; see also Tucker, Harold W. "Photographic Charging Machine." Library Journal 71: 1779-83, Dec. 15, 1946.

115. Shaw. Op. cit., p. 508.

116. Fitchburg (Mass.), Gary, and San Bernardino use marginal punched cards as registration cards; Hartford uses a "Keysort" order card; and the New York Public Library uses a "Keysort" card for applications for positions.

117. Young. "Borrower Merely Signs His Name." Op. cit.; Young. "Library Uses of the Marginal Punched Card." Op. cit., p. 96.

118. See the illustrated booklet prepared by Ralph Shaw: The Remington Rand Photocharger. New York, Remington Rand Inc., c1948. 15pp. The Recordak Corporation (a subsidiary of Eastman Kodak Co.), whose Recordak "Junior Microfilmer" is used by many public libraries, has scheduled for early publication a pamphlet with the tentative title, Recordak Photographic Book Charging. (Interview, April 11, 1950, with Frank N. Gunderson, of the Recordak Corp.) The pamphlet, Circulation Control for Public Libraries by the IBM Method (New York, International Business Machines

Corp., 1947. 11 pp.), while not necessarily involving the photographic method, is based on the principle of the "transaction" number.

119. Smith, Stewart W. "—and a Few Machines." Library Journal 74: 1044-47, July 1949. Galvin describes the procedure followed at Charlotte, a procedure based on the Smith adaptation, in "Charging System for Public Libraries." Op. cit.

120. Newton, May L., and Robert H. Blackburn. "A Punched-Card Charging System." Canadian Library Association Bulletin 6: 40-42, September 1949.

121. Ibid., p. 40.

122. Ibid., p. 42.

123. Ibid., pp. 40, 42.

124. Letter, dated June 15, 1950, from R. H. Blackburn.

125. A card of heavier stock and with rounded corners would be more desirable, however.

CHAPTER V

THE USE OF MARGINAL PUNCHED CARDS IN OTHER DEPARTMENTS OF THE LIBRARY

At the present time the principal use of marginal punched cards in college and university libraries has been in connection with the circulation department; hence by far the larger proportion of space in this report has been devoted to this particular department. However, as will be seen in the following pages, the marginal punched card system has been adapted to the needs of several other departments.

The Acquisitions Department

Libraries Using a Marginal Punched Order Card

Of the eight libraries known to the writer to be using marginal punched cards as order cards, five of them also use marginal punched cards in their circulation departments. These institutions are the American University, the University of Georgia, the University of Illinois, the Chicago Division of the University of Illinois (where the order card is identical with the one used in Urbana), and Ohio Wesleyan University. Two of the remaining three libraries are the Hartford Public Library, the only non-academic institution using a marginal punched order card, and the Nova Scotia Technical College, whose Acting Librarian, D. A. Redmond, was formerly acquisitions bibliographer at the University of Illinois and hence in a position to work with the card which, with a few modifications, he has adapted for use in his Canadian Library. (Since the latter two institutions are using their cards in ways that may be of interest to the reader. some of their practices will be referred to in this chapter.)(1)

The third library, of which mention was made—a library which uses the marginal punched card system in its order department but not in its circulation department—is Johns Hopkins University.

Description of the Cards

The Nova Scotia Technical College uses a "Cope-Chat" card 3 1/8 x 5 inches in size. All of the other libraries use "Keysort" cards, in the following sizes: 3 x 5 (The American University); 3 1/4 x 5 (Hartford, Illinois, Johns Hopkins, and Ohio Wesleyan); and 3 1/4 x 7 1/2 (University of Georgia).

In respect to the coding areas of the different cards, the patterns fall, just as in the case of card size, into three categories. The Georgia, Hartford, and Johns Hopkins cards have holes around all four edges; the Illinois card (including the duplicate at Chicago and the near-duplicate at Nova Scotia) is unperforated on the left end; and the American University and Ohio Wesleyan cards are unperforated on the bottom edge.

In general, all of the above libraries have designed their order cards so as to exploit the advantages that have been enumerated by Brown.(2) Most of the various items which have been coded into the cards are shown in Figure 23. Since the writer does not have the complete codes of all the libraries represented in the figure, it may well be that any one classification is coded, within a sequence arrangement, by libraries other than those indicated. It may also be true that some of these libraries' indirect codes provide for items not included in the list at all. But the figure will be found to present most of the items which order librarians would want to consider. (Since some of its coding is pertinent to this study, the Hartford Public Library card is included in the figure.)

Indirect coding is to be inferred unless an asterisk, representing direct coding, is indicated. Where a whole section is involved, a numeral indicates the number of 7-4-2-1 fields. An "S" is added if the coding is selective. Some of the larger universities may want to code, in addition to some of the above classifications, "country of publication," and/or "language of publication," as is the practice of the Order Division of the Library of Congress, which uses IBM cards.(3)

A number of comments will be made in connection with

a few of the coding arrangements and filing practices. (For convenience of reference the particular classifications involved will be indicated in alphabetical order, to correspond with those in the figure.)

Classification	Library
Advertise	N.S.
Agent	Ga. (3); Ill. (2) plus 8*; J.H. (2S); N.S. (2); O.W.U. (1 1/2S).
Author	American U. (2); Ga. (4); Ill. (3); N.S. (2); O.W.U. (3).
Binding	
Bound	J.H.*; Hartford.*
Unbound	" "
At Bindery	" "
Can You Supply	J.H.*
Canceled	Hartford.*
Continuation	Ga.; Hartford*; J.H.*; N.S.*
Date Ordered	
Day	Ga. (2 3/4) (extra hole unexplained).
Month	Ill. (1); N.S. (1); O.W.U. (1 1/4S).
Year	Ga. (1); Ill. (1); N.S. (1); O.W.U. (3/4S).
Quarter	J.H.*
Date Received	
Year	Ill. (1).
Month	Ill. (1).
Department	American U. (2); Ga. ("Account") (2 3/4); Ill. ("Fund") (2 1/4); J.H. (1 1/2S); N.S., 5*; O.W.U. (1 3/4S).
Exchange	Ga.; N.S.*
Foreign	Hartford*; Ill.*; N.S.; O.W.U.
Free	N.S.*
Fund	J.H. ("Endowment & Gift Funds").
Gift	American U.*; Ga.
Imperfect (Returned)	Hartford.*
Interlibrary Loan	Hartford.*
L.C. Card Ordered	American U.*
L.C. Card Received	"

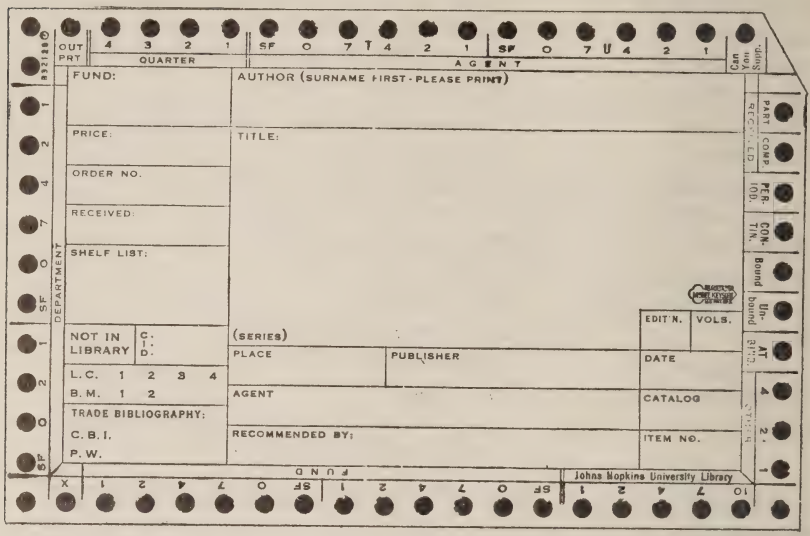
Classification	Library
Memberships	N.S.
Ordered	American U.*
Out of Print	Hartford*; J.H.*; O.W.U.
Out of Stock	Hartford.*
Periodical	Hartford*; J.H.*
Received	American U.*
Complete	Hartford*; Ill.*; J.H.*
Incomplete	" " "
Reference	Hartford*; O.W.U.
Replacement	O.W.U.
Report Requested	Hartford.*
Rush	Ill.*; N.S.*; O.W.U.*
Send Later	Hartford.*
Standing Order	Hartford.*
Subject	American U. (L.C. classification) (2); N.S. (1 1/4).

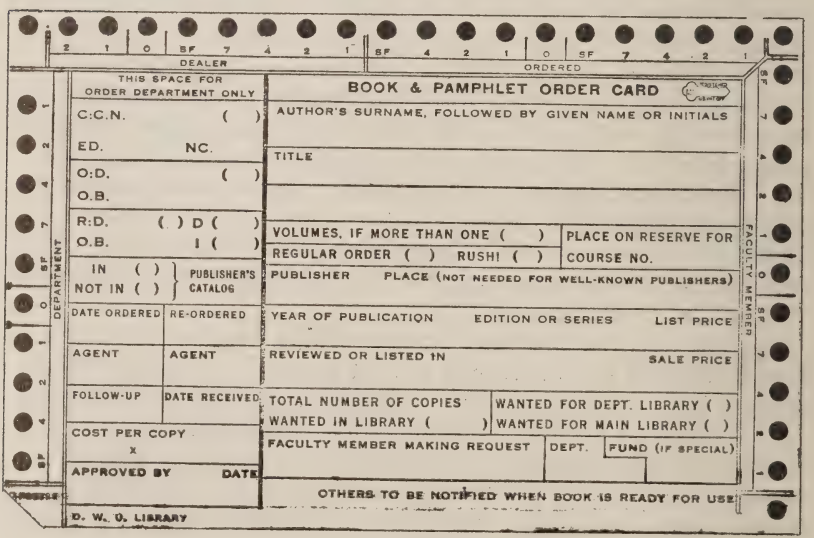
Fig. 23.—Classifications coded by libraries on their marginal punched order cards.

Agent.—The Illinois code provides for both direct and indirect sorting in the same section, as illustrated in Figure 5 (p. 53). Nova Scotia assigns specific numbers to its agents and publishers, reserving one number for "all others." (Redmond indicates that the arrangement could have been improved by assigning to the more common agents numbers which could be coded with not more than two notches.)(4) Ohio Wesleyan assigns six numbers, respectively, to its principal dealer for regular orders; its "o. p." dealer; its foreign books dealer; the Superintendent of Documents; etc.; and uses a 23-division alphabet for designating the sources of all other orders.

Author.—Nova Scotia has three fields available for this classification, but uses only two of them, ". . . since we seldom have more than 500 outstanding orders at one time . . . ."(5) The original design of the Ohio Wesleyan card omitted author coding, providing only for dealer, date ordered, department, and faculty member (see Plate IX).(6) On the right-hand edge of the card a 2-field selective code

PLATE IX. Samples of Marginal Punched Order Cards





was included so that the library could designate, for each order, the instructor who made the recommendation. If a faculty member wished a report on his orders, or if he wished to review them himself, the library could separate his orders from the remainder of the file in a few minutes. Another advantage of such coding would be that, on an instructor's leaving the institution (through retirement, transfer, or for whatever cause), the head of his department, together with the circulation librarian, would be able to review, for purposes of weeding, etc., the titles which had been added to the library at the request of the particular instructor.

A decision was finally made, however, to replace the "faculty member" code with an author code. Much as the order department would have liked to provide the advantages named above, consideration was given to the following points: (1) Not many requests would be made for a review of the cards representing a particular instructor's book orders; and when such requests were made, the needling of the department cards, and a hand-sorting of the faculty member's cards, could be substituted for the superseded arrangement. (2) Since the initials of the instructor were placed in the books he ordered (along with the date, cost, and source), and since most of the instructor's books would be shelved together, under the Dewey classification, the need for an auxiliary weeding aid would be lessened. (3) After the order cards had been mixed up, as the result of their arrangement by department, or dealer, etc., the lack of an author code was a distinct handicap when the time came for rearranging the cards in their original order.

Since a rather fine breakdown by author was desired; since selective sorting would not be needed; and since, by using the corner hole at the bottom, three complete fields could be made available—the 2-field code designed for use with "faculty member" was ignored and a 3-field arrangement substituted. (Notching the card for the latter code is facilitated by superimposing a cut-off card as described on p. 39.) Had it been known, from the beginning, that the card would bear an author code, this code would have been placed at the top, in accordance with the recommendation made on

page 36.

In the libraries under consideration the general practice is not to use the author code except to rearrange a disarranged file and to put into alphabetical sequence a group of cards about to be placed in the main order file. At Illinois, for example, ". . . the order file normally contains 12 to 15 thousand order cards and it would not be efficient to needle all those to file in perhaps 200 cards."(7)

Date Ordered.—Georgia uses its day-of-the-year code, along with its "permanent vendor numbers," to provide "complete identification of each order."(8) Ohio Wesleyan had planned, originally, to code its book orders according to the week in which the order letter was written. This plan was canceled, however, in favor of coding by year and month. In the "year" coding, No. 1 was assigned to the academic year '48-49, since the system was installed during the first semester of this particular year. After 1954-55, the sixth year of operation, all of the '48-49 cards will be sorted out and retired to a "dead" file, and No. 1 will be reassigned to the year '55-56. The "year" code also makes it possible, of course, to distinguish between orders placed during a certain month of the current year, and ones (the o. p., foreign, and other very slow orders) placed during the same month of the preceding year.

Date Received.—In describing his coding routine, Brown says, "The field which had previously been coded for date ordered is now coded for date received."(9) Since, however, the card reproduced in the article has only a single-row 2-field section for year and month ordered, the coding of date received in this section would not be possible without the use of card savers, which Brown does not mention. It is probable that, through an oversight, Brown simply failed to indicate that the "date received" coding was provided for by an inner row of holes. No change was made in the design of the card shown in the article, but eight extra holes, corresponding to those for "date ordered," were punched in the card. The present arrangement, then, is to code "date ordered" in the outer row, and "date received" in the inner row.

Of possible interest to some librarians is a code which

provides for grouping the months of the year by semesters, quarters, or by whatever divisions are desired. For purposes of illustration, Figure 24(10) represents a grouping according to the four quarters of the calendar year.

Quarter	Month	Code
1st	Jan.	1 & 4
	Feb.	2 & 4
	Mar.	3 & 4
2nd	Apr.	1 & 5
	May	2 & 5
	June	3 & 5
3rd	July	1 & 6
	Aug.	2 & 6
	Sep.	3 & 6
4th	Oct.	1 & 7
	Nov.	2 & 7
	Dec.	3 & 7

Fig. 24.—Arrangement for coding the months of the year by quarters.

(Nos. 8 and 9 may be added, if desired, to code, respectively, the first and last halves of the month.) Under this arrangement, all of the cards representing orders placed during, say, October, November, and December, could be sorted out by needling No. 7. If the cards for only one of the months, say, October, is wanted, positions 1 and 7 would be needled. If it is necessary to review the orders dated during the first half of November, needles would be inserted through holes 8, 7, and 2.

Department.—Prior to the installation of the marginal punched card system at Ohio Wesleyan, the order department maintained a loose-leaf record, arranged by departments, in which each order would be listed, giving, briefly, the author, title, date ordered, date received, cost, etc. This record, which involved duplication of the data on the order card, the library was able to dispense with after con-

verting to "Keysort." Information regarding a particular book is available now, just as under the old system, through the author file. And if cards for all of the recent departmental orders are wanted, the library can sort them out on short notice.

It will be recalled that Ohio Wesleyan's registration card (described on pp. 107-09) provides a space in which the student indicates his major field, native state, vocational choice, special interest, etc. The order department has been able to use some of this information to extend the scope of its services. For instance, if the library receives a biography of "the favorite son" of a particular state, all of the students from this state can be notified. If the library obtains a book on architecture, all of the students in school who signed a registration card and who indicated architecture as their vocation, can be advised regarding the book's availability. During the second semester of 1948-49, the order department sent a number of notices like the following:

> To all students who had indicated on their library registration cards . . . that their vocation or special interest was Politics:
>
> You may be interested in the following book, recently received by the library: 329/S42 How to Go into Politics, by Hugh D. Scott, Jr. ('49).
>
> To students interested in Writing: 029.6/886 On Being an Author, by Vera M. Brittain ('48), and 813.5/R642r/z I Wanted to Write, by Kenneth Roberts ('49).
>
> To students interested in Law: 340/R12 The Law and You, by Max Radin ('48).
>
> To students interested in Race Relations: 325.26/0916 Black Odyssey, the Story of the Negro in America, by Roi Ottley ('48), and 331.6/K42 The Social Politics of the FEPC, by Louis C. Kesselman ('48).(11)

After calling to the attention of camera fans a special recently-published item dealing with photography, the order department, on behalf of the various departments concerned, concluded its note by saying, "The library, of course, is always at your service in answering questions

and furthering your reading interests in connection with this hobby."(12)

Coding the order card for subject, as is done by American University and Nova Scotia, would naturally facilitate such a service as has been referred to above.

Combination of Multiple-Slip Order Forms(13) and Marginal Punched Cards

Despite the advantages of using the marginal punched card system for acquisition work, the system is not without its competitors. Boisen, at Butler University, indicates that he and his staff ". . . experimented for several months . . ." with a marginal punched order card, ". . . and have given it up. We find that there are several things we wish to know at sight without sorting and that our old multiple paper slip does a better job of it."(14) Penn State also uses a multiple-order-form arrangement and indicates no intention of changing to marginal punched cards for book orders.(15)

Librarians who are attracted by the features of the multiple-slip order system will be especially interested to know that the marginal punched card manufacturers have made available a multiple-slip marginal punched form which will provide for the order department the advantages of both systems. Brown University is installing such a system (using McBee forms) in the summer of 1950, and the University of Georgia hopes to make such arrangements by 1951.(16)

Regardless of what kind of procedure the librarian adopts in the future, he will certainly want to examine the article by Brown(17) if his order department is now using one of the more or less conventional systems.

The Serials Department

Libraries Using a Marginal Punched Serials Card

As far as the writer can ascertain, there are only five libraries using marginal punched cards for their serials record: the University of Georgia, Pennsylvania State College,

Purdue University, University of Tennessee, and University of Washington.(18)

Description of the Cards

Except for being marginal punched, the only characteristic which the cards have in common is that they are perforated on all four edges with a single row of holes. Washington uses the new 3 x 5 "Rocket" Standard Library Analysis Card, Form Y16, referred to earlier. The other institutions use "Keysort": Penn State a 3 1/4 x 5 card; Georgia a 3 1/4 x 7 1/2-inch card; and Tennessee a 4 x 6 card.

The various classifications coded by these libraries are shown in Figure 25. As in the case of Figure 23, indirect coding is assumed in the absence of an asterisk, which designates direct coding. Where numerical coding is employed, the figure in parenthesis indicates the number of 7-4-2-1 fields.

The System at Pennsylvania State College

In commenting on the Penn State system, where "about 2,400 continuing or subscription titles" are controlled, Campbell says, "We do not sort out any particular classes or battery of classes more often than 15 or 20 times a year, but at any minute a dozen to fifty of the individual cards are attached to other papers in process of preparing orders or approving bills."(19)

As to the cost of the Penn State installation, Campbell reports that 10,000 cards "(probably 10 years' supply)" cost

Classification	Library
Country of Origin	Washington (1 1/4)
Department	Penn State*
Frequency of Publication	Washington (1) (combined with "Type")
Fund	Ga. (2 3/4); Tenn. (2); Washington* ("gift funds and other special funds")

Classification	Library
Language	Washington (1 1/4)
Location	Ga. (1); Tenn. (2); Washington (1) (also indicates whether "Duplicates, Current Numbers only, Bound Volumes only, or Entire File")
Price ("List Price")	Ga. (1)
Renewal Date	Penn State (Apr., Aug., Dec.)*; Tenn. (13 holes, providing semi-direct coding for years 1940-69); Washington (1).
Source Agent or publisher	Ga. (3); Penn State (Faxon, Stechert, Direct)*; Tenn. (2) (uses a single number to designate "Publisher"; also a single number to designate "British Publication"); Washington (2).
Purchase, Gift, or Exchange	Tenn. (codes "Gift" and "Membership" under Fund, and also "Gift" under Agent or Publisher).
Subject	Tenn. (2); Washington (3) (Dewey)
Title	Ga. (4); Penn State (1 1/2) (initial letter only); Tenn. (3); Washington (2 1/2) (codes first two letters; cards are arranged alphabetically by title under agent).
Type	Washington (1) (combined with "Frequency"; indicates whether "newspapers, periodicals, continuations, or sets in process.")
Year Subscription Begins	Ga. (1).

Fig. 25.—Classifications coded by libraries on their marginal punched serial cards.(20)

approximately $80.00. The system "saves at least $50 a year in time spent . . . sorting the p-slip file for classes. Such a class might be 'renewals for Forestry branch

through the Stechert agency due between December and April.' The tumbler does without error what nobody in the Order Department could do perfectly otherwise . . . ." Campbell recommends such a system to any library ". . . whose Order Department has to control more than 1,000 continuations in a file separate from all check-in files."(21)

Use of the New "Rocket" Card (Form Y16) at the University of Washington(22)

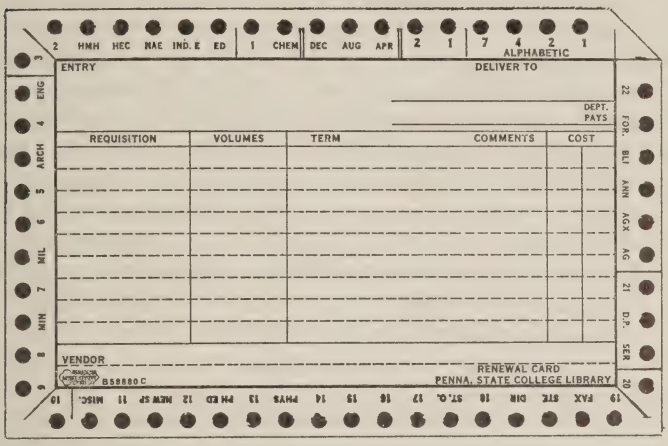
The serials-record system at the University of Washington is just getting started. Putnam writes that the data from the old file cards are being transferred to the marginal punched cards, the new forms ". . . being interfiled until the hopeful situation of complete substitution arises. Until that time we shall not know how successful we have been in its arrangement."(23) Since the Hadley Company's Form Y16 card is being used at the University of Washington, the operation of the system here will be watched with special interest by librarians in other institutions. After this library has had an opportunity to appraise the new set-up, its evaluation, along with recommended procedures, may be made available, through publication in some form (as a sequel to, or revised edition of, the above-mentioned pamphlet), for the benefit of other serial departments.

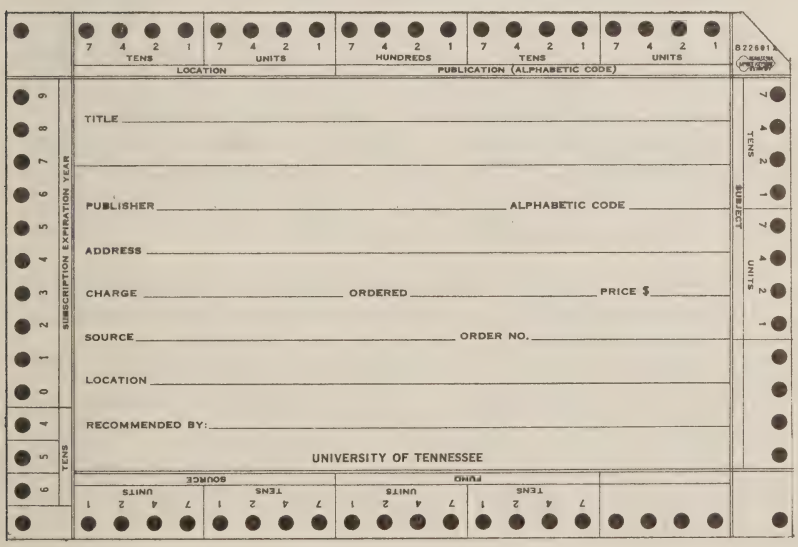
The Reference Department

Disadvantages of the Conventional Type of Index File Used by Reference Departments

There are few reference librarians who do not use one or more conventional index files in connection with their work. The file which constitutes their chief resource is, of course, the card catalog. It is not proposed that author, title, and subject information in this file be transferred to marginal punched cards. Even if the card included, in addition to the bibliographical information, the actual text of the book, a punched card system would not be practicable for the public catalog.(24)

PLATE X. Samples of Marginal Punched Serial Cards





The reference librarian's small desk files, however, are readily convertible to marginal punched files. Where a single reference is involved, and where the subject heading is an obvious one, it is doubtful if the standard type of index-card arrangement can be improved upon. Besides, it would certainly be distracting to the readers if the reference librarian, stationed in a public-service area, were obliged to thump his desk with handfuls of marginal punched cards every time he had to use the file. But the problem lies in the fact that many index files contain complicated references. And no one ". . . needs to be reminded of the many hours often lost in a frantic search for a specific item, either because it has been misfiled or else has been placed into a classification which, at the time seemed to be the logical one, but which no longer appears to be so."(25)

The two chief complaints made against the conventional file are that (1) a card becomes lost, for all practical purposes, in case it is misfiled—a condition that is impossible with the marginal punched cards, since needling the appropriate hole will drop out the card regardless of the latter's position in the file—and (2) cross-referencing is necessary.

Ames and Kujawski consider the simple cross-referencing techniques of marginal punched cards to be such an advantage that this feature alone might often justify the abandonment of conventional filing in favor of a marginal punched card system.(26) Lawson compares the two arrangements—conventional and "Keysort"—in connection with the preparation of a bibliography:

> A book such as Professor Schlesinger's New Viewpoints in American History . . . would require, if indexed by traditional methods, at least twelve separate bibliographic cards: one for the book in general, and one for each of the eleven essays. With the Keysort technique, however, only one card would be necessary and by virtue of the coded slots, the book could be located under any of the different subject classifications into which the essays fall.(27)

One case is cited in which the elimination of cross-reference sheets in a conversion from conventional to

marginal punched cards was largely responsible for the decrease in size of the total file from twelve drawers to four.(28)

The reference librarian's marginal-punched file may consist of a small pack of cards, kept under a rubber band, in no particular order, inside his desk drawer, or it may involve an elaborate setup of several file cabinets. No reference librarian, at present, so far as the writer is aware, uses marginal punched cards at all; but the knowledge of the availability of marginal punched stock forms, especially of the "Rocket" card, Form Y16, is very likely to encourage a few librarians to adopt this system for reference purposes. The stock card would be especially useful in the field of bibliography. The Hadley Company pamphlet, previously referred to, contains the following pertinent paragraph:

> Once the library has established the pattern for a bibliography in any field, the data can be listed on Rocket cards by fields of investigation and broken down into many sub-fields, such as by countries, by periods, by centuries and by decades within centuries. In History and Literature, for instance, the code might be arranged for a political, social, economic, geographic, or cultural approach as well. From such a file small sections can be quickly assembled by needle sorting. As new items are added to the library, cards can be added to the file. Nothing has to be rewritten . . . .(29)

Use of Marginal Punched Reference Files by the Small Library, by Special Departments, and by Individuals

The fact that marginal punched cards may be used on a very limited scale, makes it possible for the person doing reference work in the smallest college library to employ the system. The purchase of a sorting needle, a hand slotter, a few packages of card savers, and a few hundred stock cards, would meet the total requirements for a small installation.

Not only are the advantages of such a system available to the main library, but also to the staff members or the in-

structors who supervise the departmental collections. In fact, it is particularly in the more specialized fields of knowledge that some of the most effective applications of the marginal punched card system can be made. Attention has already been called (p. 20) to the extensive use of marginal punched cards by chemists. Research workers in other departments may find references in their respective journals to adaptations of the marginal punched card system which will meet their special requirements. For example, Fischer describes a specific application of "Keysort" cards to bibliographic classification in the field of psychology.(30)

Even where the reference librarian does not use marginal punched cards for his own purposes, he may often be in a position to recommend their use to graduate students and others. Had the writer fully appreciated, before beginning the collection of material for this book, the advantages of having his notes on marginal punched cards—for instance, one of the 5 x 8 forms, "Keysort" KS581B (described on p. 37-38) or "Rocket" Y9 (described on p. 191)—this is the system that he would have employed.

Several articles have described marginal punched cards designed for personal use. Krieger, for one, designed such a card for his own use, but he ". . . hopes that the principles developed may prove to have some wider utility."(31)

At least one of the stock cards used by the McBee Company (Form KD584B) was designed by Gerald J. Cox, to whom reference has already been made. This is a 5 x 8 card, providing a double row of holes on the two long sides (with direct index at the bottom and in the inner row of the top, and classification and date indexes in the top outer row); a numerical index at the left end and an alphabetical index, using the O-I-E-C-B code, on the right.

Isbell gives the step-by-step procedure for setting up a random-number coding system like the one he uses in his work with General Mills (pp. 69-71).(32)

Wiegand has described a system ". . . for the personal use of engineers which allows cards to be located readily by author, date, source, or subject."(33) Using the 5 x 8 "Keysort" stock card No. KS581B ("Old No. KS182"), re-

ferred to earlier, Wiegand comments as follows:

> A real advantage of this type of card is that the cards may be used as ordinary file cards without subject analysis until sufficient cards have accumulated to indicate the trend of interest. It is suggested that students considering advanced study purchase a supply of punch cards and use them as ordinary reference cards until the number of cards warrants establishing a coding system and punching the cards. The cost compares favorably with ordinary 5'' by 8'' cards and the punch cards have sufficient space for long abstracts.(34)

One of the points mentioned by Wiegand will bear re-emphasis and elaboration. Cox, Bailey, and Casey have indicated that

> It is not necessary for the bibliographer at the beginning of his task to decide on the various classifications to be coded. Indeed, it is undesirable that he do so. Instead, he should commence the literature search, transferring his findings to the punch cards the same as he would do with any cards. In this way he will gain sufficient familiarity with the field to permit rather accurate prediction of the various categories into which references obtained by further searching are likely to fall. He will also be enabled to decide what phases of the subject are important enough to deserve coding. Then and only then should he undertake the preparation of an outline to be used as a guide in the coding of the cards.(35)

Special Considerations

Some other considerations, to be borne in mind by the person doing reference work with marginal punched cards, are indicated below. A few will have rather general application, and others will be of interest particularly to the librarian working in a specialized department.

An editor's footnote includes the reminder that the author index is ". . . ordinarily of minor importance in a literature search. In other words, if a punch-card gets too crowded, the thing to compress or even leave off completely would

probably be the author index."(36)

When titles of periodicals are being coded, Westbrook and DeWald point out the disadvantage of coding the initial letters of "such words as Journal, Transactions and Review . . . ." (The authors have reference to a 3-letter code.) As an illustration of the recommended procedure, they suggest that the periodical Metal Progress (assumed to be in a file where several other titles begin with the same word or letters) be coded, not by following a consecutive arrangement of the letters, but by choosing some such combination as "MPR."(37)

Cox, Casey, and Bailey mention that, with slight modifications, their 3-letter author code (Fig. 20, p. 76) may be used for coding subjects.(38)

The same authors also point out that, where many "anonymous" publications are to be coded under this particular classification, the alphabetical code should be adapted to this necessity by assigning one of the numbers in the series to "Anon."(39)

If the reference librarian's files are likely to be so large that sorting through all of the cards would require an excessive amount of time, the advisability of using two or more subject files should be investigated. Such an arrangement, it is recognized, often nullifies one of the principal merits of the marginal punched card system, but it can be used under certain conditions. For instance, in a college or department where there are reference files on the various metals, the series of cards dealing with aluminum could be filed separately from those dealing with steel.(40) Or in the home economics department library, extensive files on the different vitamins could be segregated, for the sake of convenience in sorting, according to whether the material dealt with one vitamin or another.(41)

Westbrook and DeWald, with special reference to the card which they designed for bibliographical purposes, feel that ". . . the basic theories of (a) direct sorting and (b) readable classifications of primary and secondary titles of major interest combined with (c) a coded classification for the remaining subjects are applicable to any file requirements."(42)

Ames and Kujawski use a plus sign on their card, together with a secondary author index, to code publications of multiple authorship.(43)

Krieger leaves unpunched a hole marked "uncertain" or "further classification," whenever he feels ". . . that the classification of a particular item is not satisfactory or is subject to future revision. This provides a means of periodically reviewing all such items in the light of further experience."(44)

Wiegand calls attention to the fact that in sequence coding, the numbers 1, 2, 4, 7, 10, 20, etc., require only a single punch, while the numbers 3, 5, 6, 8, 9, 11, 12, 14, 17, etc., require two punches, and the numbers 13, 15, 16, etc., require three punches. Wherever possible, he suggests, the numbers demanding the least amount of punching should be used to code the classifications which need to be sorted out most frequently.(45)

Centralized Indexing Service

There are a number of reference libraries that are in a position to provide special indexing services to branches, extension centers, individual research workers, etc. The librarians who are now providing, or who might consider providing, such services should investigate the advantages of using marginal punched cards for this purpose.

Such a system is already being employed in industry. The Socony-Vacuum Laboratories, at Paulsboro, New Jersey, distributes technical-information references on "Keysort" cards to individuals and groups doing petroleum research.(46)

The Rubber Formulary, from its office in Bakersfield, California, distributes to its subscribers each month a set of marginal punched cards on which are mimeographed the abstracts of particular articles which have been published but which are not indexed in the literature. Each new subscriber receives a sorting needle and an instruction booklet. In case he wishes to supplement the indexing which is already code-notched in the cards, extra holes are provided for this purpose. Furthermore, the Rubber Formulary

makes available to him blank cards printed with a different ink from the one used on subscription cards, so that, if he desires, he may add to the value of the main file by incorporating with it a marginal punched card index to his own research work and/or to the pertinent material in his own files.(47)

An Adaptation of the Marginal Punched Card System for Use with Conventional File Cards

Reference librarians who would like to replace their present plain-card file with a marginal punched card file, but who realize the large amount of work involved in transferring the information from the original file to the new one, may be attracted to a system which does not require that such information be transferred.(48) Each card is coded and notched, but according to a principle which, while departing from that of the marginal punched card system, retains some of the latter system's advantages. ". . . the operation for cross-indexing involves notching the reference card along its top or side edges at positions corresponding to each of several different subject headings indicated on a master card.(49) The master card, and only the master card, is perforated. (For purposes of the present illustration we may assume that the master card, which is "made from an ordinary blank card of the size used in the file," is perforated only along the top and the left edge.) Subject headings are indicated opposite the holes, general headings being reserved for the left side of the card, and specific headings for the top. To index the data on a particular card, the card is placed beneath the master card and marks are made on the file card through the appropriate holes. Then the file card is notched opposite the marks.

General information is obtainable at once since the file is arranged in general sections. (The cards are filed alphabetically by author under each section or general heading.) As each card in the general section has been punched in the same position along its left-hand margin, the section as a whole now exhibits a groove,

along its side. Any card out of place shows up as a break in the groove.

To find a specific reference in a general section, the cards are first brought into alignment by moving them against one side of the drawer. The master card is then held in position in front of the section, or moved horizontally over the section if it is a long one, and the desired cards selected.

By this method it is possible to select one or two specific references out of several hundred cards in a matter of seconds.(50)

The Mounting of Clippings, etc., on Marginal Punched Cards

If the reference librarian's files are on paper slips or on light-weight card stock, an alternative to the above-described system may be investigated. This method, which exploits all, instead of only some, of the advantages of the marginal punched card system, consists simply in mounting the present forms on marginal punched cards.

The Corrosion Engineering Section of the International Nickel Company adopted this method in order to avoid the retyping of an extensive file.(51) "Kodak dry mounting tissue and a Kodak dry mounting press were used. This tissue gives a flat, permanent mount which does not make the card too thick and which will not dry out or discolor in time."(52) (A piece of the chemically treated tissue is cut to the same dimensions as those of the material to be mounted, and inserted under the latter; the welding is then accomplished by the application of heat.)

In connection with marginal punched card bibliographical files the American Foundrymen's Society suggests, with reference to abstracts or annotations which appear in a publication, that such items "be cut out and pasted firmly on the face of the card."(53)

Westbrook and DeWald, who agree with Voigt on the desirability of using a dry mounting tissue,(54) offer some helpful advice regarding the mounting of clippings:

. . . it is important that the pasted clipping be absolutely

flat on the card with no bubbling or curling at the corners, else the cards will catch on one another during sorting . . . . If possible, it is advisable to alternate the position of the mounted clipping from left to right and top to bottom when preparing a group of file cards to avoid bulging at either side of the file or at the center.(55)

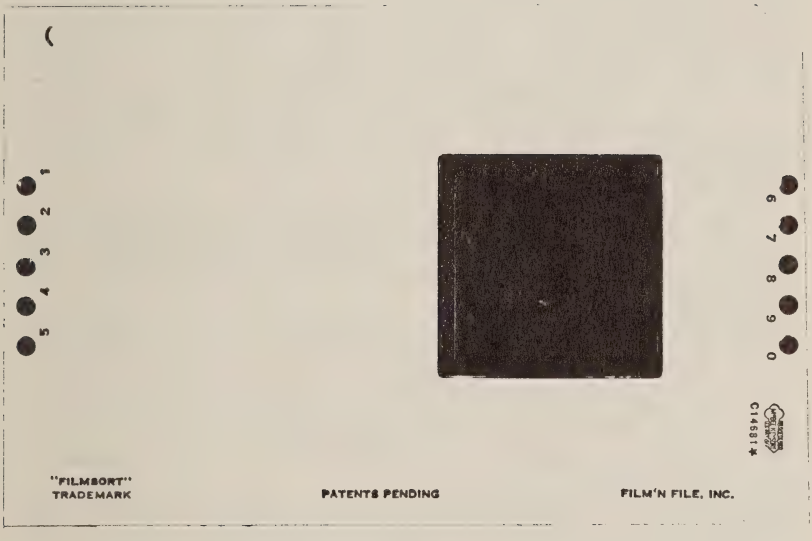
The Use of Microfilm Inserts with Marginal Punched Cards

The following paragraph should be of special interest to reference librarians. The author of the paragraph happens to be referring to machine-type punched cards, but all of his statements apply equally well to marginal punched cards, since the latter are also available with the feature which he describes.

> Of late an intriguing method has been devised whereby the punched card technique can be combined with microphotography to the enhancement of each. By cutting up a roll of microfilm into individual negatives and then sealing the individual strips into a specially devised slot in the punched cards, certain unique benefits accrue. Insofar as the microfilm negative is concerned these are chiefly the great convenience of this novel method of filing and indexing, and the consequent enhanced accessibility of the film to the user. In the case of the punched card its utility is doubly enhanced in that it not only carries its information in the form of a code but also in the form of a visual record, whether it be a picture or a map, a document or a note.(56)

Moriarity indicates that John F. Langan is the inventor of the above system.(57) The headquarters of Film 'n File, Inc., with which company Mr. Langan was formerly associated, are now at 330 West 42nd Street, New York 18, N. Y. "Filmsort," the trade name for the system, was at first used only with IBM cards, but today the company is equipped to process marginal punched cards and other types as well. Institutions desiring "Filmsort" service furnish their own cards and "Filmsort furnishes the equipment and

PLATE XI. A "Keysort" Card Processed for Microfilm Insert



aperturing to adapt your cards for microfilm insertion."(58) Depending on the size of the card (3 x 5 to 6 x 8 inches) and the size of the film (16 mm. or 35 mm.), "Filmsort" can supply one to four apertures to a card.(59) A map as big as 36" x 48", or six pages, each 8 1/2" x 13", can fit into a Filmsort card as small as 3" x 5".(60)

Only the large university libraries will be able to purchase Filmsort equipment. In both of the brochures referred to above, the separate pieces of equipment are illustrated and described, but since the prices are not included, the reader may be interested in having this information. The Filmsort camera sells for $695; the Mounter ("transfers 400 frames of microfilm per hour from the film roll into cards") for $350; Filmsnips ("for mounting up to 150 film frames daily") for $25; and the Filmsort Viewer (enlarges the film frame to its approximate original size on a 16" x 16" screen) for $495.(61)

When the library does not purchase its own equipment for providing "Filmsort" service, contractual arrangements, on a job basis, may be made with the Film 'n File Co.(62)

One of the writer's correspondents has written that a group of chemists (including J. W. Perry, who has been mentioned earlier in this book) and librarians are "planning to use 'Easy-Sort' cards with inset frames of microfilm in processing chemical bibliography for Chemical Abstracts."(63)

The Prints and Photographs Division of the Library of Congress is considering the adoption of "Keysort" cards for its Art Catalog, each card to bear a positive microfilm reproduction. The file would be arranged basically by name of artist, "but coded for selective analysis by nationality, technique, period, subject, etc."(64)

The McBee Company formerly made available a "Keysort-Microfax" card which incorporated the microfilm-insert feature, but this line has been discontinued.(65) Librarians interested in "Filmsort" should communicate directly with Film 'n File, or with one of the company's distributors.

Other Departments

The Marginal Punched Bindery Card at the University of Georgia

The University of Georgia uses a "Keysort" card for its bindery records. The dimensions of the card are 3 1/4 x 7 1/2 inches, the same as those of the library's serials and order cards. Provision is made for coding and notching the "Account" (2 3/4 fields); "Months Gathered for Binding" (12 holes, for direct sort); the "Year" (3 holes, for "odd," "even," and "irregular"); and "Source" (3 fields). Four fields are available, at the top of the card, for coding "Title," but this section, and the holes at the ends of the card, do not seem to be used. Columns are provided for the indication of "volume," "year," "sent," and "received," and there is space for supplying information as to each of the following items: Title, Call No., Destination, Type, Color, Size, Title Page, Index, Volumes Bound as One, Cumulates, and Gathered.(66)

With the above exception, marginal punched cards are not being used, so far as the writer is aware, in departments other than those which have already been mentioned.

Other Library Uses of Marginal Punched Cards

The University of Washington is considering the use of its Y16 "Rocket" cards "in compiling bibliographies and Want Lists for easy sorting under various desired headings."(67) Other uses of the same card, as suggested on the title page of the pamphlet, The "Universal" Marginal Punched Library Card, referred to earlier, are: Registration Records, Exchange Records, Binding Records, and Serial Records Other than Checking Files.

Librarians who have already become familiar with marginal punched cards through having used them in one or more departments, will naturally begin to look at their other departments, or at other areas of service, as possible users of such cards. One librarian may find that his present system of record keeping in connection with the library's equipment-and-supplies' inventory may be more

conveniently and more economically maintained if replaced by a marginal punched card system. Another librarian may see in the marginal punched card system an appropriate means of handling his student-assistant records. The details of whatever setup is used will depend on the nature of the job to be done and on the ingenuity of the person or persons who supervise the installation.

FOOTNOTES

1. Hartford has recently revised its order card and expects delivery of the new form from the McBee Company by June, 1950. (Letter, dated April 19, 1950, from Magnus K. Kristoffersen.)
2. Brown, George B. "Use of Punched Cards in Acquisition Work: Experience at Illinois." College and Research Libraries 10: 257, July 1949.
3. Keller, Alton H. "Book Records on Punched Cards." Library Journal 71: 1785, Dec. 15, 1946.
4. Letter, dated Jan. 23, 1950, from D. A. Redmond.
5. Ibid.
6. The space in the upper left corner of the Ohio Wesleyan card is used as follows: If a title is not in the card catalog (C), not on order (O), and not in the received file (R), the assistant places check marks in the appropriate places and indicates date (D) and initials (I). The other abbreviations are for call number; edition; number of copies; and ordered by; the D's, following ordered and received, are for date. On the Johns Hopkins card the letters following "Not in Library" are abbreviations for: Catalogue, Index File, and Dissertation File. (Letter, dated May 13, 1949, from Homer Halvorson).
7. Letter, dated April 26, 1949, from George B. Brown.
8. Letter, dated April 30, 1949, from Evelyn Fritz.
9. Brown. Op. cit., p. 220.
10. Adapted from The Findex Co. Findex Classification Manual. Milwaukee, The Co., 1929, p. 44.
11. Ohio Wesleyan University. The Library. "Report and Review, 1946-1949."
12. Ibid.
13. See Lyle, Guy R. The Administration of the College Library, 2d ed., rev. New York, H. W. Wilson Co., 1949, p. 367; or Wilson, Louis R. and Maurice F. Tauber. The University Library, Its Organization, Administration, and

Functions. Chicago, University of Chicago Press, c1945, p. 147.

14. Letter, dated Dec. 19, 1949, from Harold L. Boisen.

15. Letter, dated Jan. 10, 1949, from Wayne R. Campbell.

16. Letter, dated Dec. 16, 1949, from David A. Jonah; letter, dated March 15, 1950, from Evelyn Fritz.

17. Brown. Op. cit. To the writer's knowledge, this is the only article which has been published on the subject of marginal punched order cards.

18. Purdue began using marginal punched cards in its serials department in 1949, but the writer, unfortunately, has been unable to secure information regarding the type of card used or the procedure followed. Phyllis Foreman, Librarian of the Hydroelectric Commission of Ontario, Canada, is using "Keysort" cards in connection with a short-term loan service, routing "6000 to 7000 periodicals a month" and keeping them moving on a 3-day loan basis. (Letter, dated April 20, 1950, from D. A. Redmond, of Nova Scotia Technical College.)

19. Letter, dated April 28, 1949, from Wayne R. Campbell.

20. Based on the following sources, in addition to the cards themselves; Georgia—Letter, dated April 30, 1949, from Evelyn Fritz; Penn State—Letter, dated Nov. 17, 1948, from Evelyn Hensel; letter, dated April 28, 1949, from Wayne R. Campbell; Tennessee—Letter, dated April 26, 1949, from A. L. McNeal. (It should be added that Tennessee provides four columns on the back of its card for Volume, Received, Date of Bill, and Cost.); Washington—Pacific Northwest Library Association. "Committee on Library Supplies and Equipment." (Report) PNLA Quarterly 14: 82, January 1950 (the only article, to the writer's knowledge, which mentions a marginal punched serials card); the Hadley Co. pamphlet on the Form Y16 card (see footnote No. 22.)

21. Ibid.

22. See Plate IV, p. 33. The Hadley Company has recently (June, 1950) issued a pamphlet dealing with this card, under the title of The "Universal" Marginal Punched Library Card. In this pamphlet Marguerite E. Putnam, Acquisitions Librarian at the University of Washington, who helped to design the card, has collaborated with some of her fellow staff members and with the Hadley Company in describing (in detail and with actual-size illustrations) how the card is used as a "serial agents record file" at the University of Washington Library.

23. Letter, dated March 29, 1950, from Marguerite E. Putnam.
24. Rider, Fremont. "Microcards and Punched Card Filing." College and Research Libraries 10: 233-35, July 1949.
25. Lawson, Murray G. "The Machine Age in Historical Research." American Archivist 11: 143, April 1948.
26. Ames, Stanley R., and Wilma F. Kujawski. "Use of Punched Cards for Indexing and Classifying Biochemical Literature." Special Libraries 39: 238, September 1948.
27. Lawson. Loc. cit.
28. Voigt, Lorraine R. "Punched Cards for Filing Corrosion Test Results." Corrosion 4: 589, December 1948.
29. The Charles R. Hadley Co. The "Universal" Marginal Punched Library Card. Los Angeles, The Co., (1950), p. (1).
30. Fischer, Robert P., J. H. Rapparlie, and C. C. Gibbons. "A System for Coding, Filing and Using Bibliographical Material for Research Purposes." Journal of Applied Psychology 31: 329-39, June 1947.
31. Krieger, K. A. "A Punched-Card System for Chemical Literature." Journal of Chemical Education 26: 163, March 1949.
32. "Facts with a Punch." Progress Thru Research 3: 8, Fall 1948.
33. Wiegand, James H. "A Personal Punch Card System." In American Chemical Society, 115th Meeting, San Francisco, 1949, Abstracts of Papers. p. 7EE.
34. Wiegand, James H. "Punch Card System for Personal Use." Unpublished MS. (Hectographed) p. 2. (Made available to the writer through the courtesy of the author.)
35. Cox, Gerald J., C. F. Bailey, and Robert S. Casey. "Punch Cards for a Chemical Bibliography." Chemical and Engineering News 23: 1626, Sept. 25, 1945.
36. Hood, T. A. "Punch Card for the Field of Metal Finishing." Metal Progress 56: 76, July 1949.
37. Westbrook, J. H., and L. H. DeWald. "A Modified Punch Card Filing System for Metallurgical Literature." Metal Progress 54: 327, September 1948.
38. Cox, Gerald J., Robert S. Casey, and C. F. Bailey, "Recent Developments in Keysort Cards." Journal of Chemical Education 24: 70, February 1947.
39. Ibid.
40. "(American Foundrymen's Society) Uses Punch System to Index Foundry Literature." American Foundryman 14: 35, October 1948.

41. Ames and Kujawski. Op. cit., p. 235.
42. Westbrook and DeWald. Op. cit., p. 327. (Italics theirs).
43. Ames and Kujawski. Op. cit., p. 236.
44. Krieger. Op. cit., p. 164.
45. Wiegand. "Punch Card System for Personal Use." Op. cit., p. 3.
46. Crandall, George S., and Betty M. Brown. "An Information Service Using Both Hand and Machine Sorted Cards." Journal of Chemical Education 25: 203, April 1948.
47. Rostler, Kathleen S. "Application of Punched Cards to Indexing Rubber Compounds." India Rubber World 120: 698+, September 1949.
48. Aldous, J. G. "Simple Method for Cross-Indexing a Reference File." Science 106: 109, Aug. 1, 1947.
49. Ibid.
50. Ibid. (It will be recalled that the new Harvard College call card, described on pp. 114-16, is of this same type.)
51. Voigt. Op. cit., pp. 583-84.
52. Ibid.
53. American Foundrymen's Society. Op. cit., p. 35.
54. Cox, Casey, and Bailey recommend "the use of nitrocellulose or other plastic base cement as it does not curl the cards or leave tacky residues." Op. cit., p. 67. An adhesive such as Carter's Rubber Cement, available at most stationers', would doubtless be satisfactory in many cases.
55. Westbrook and DeWald. Op. cit., p. 327.
56. Lawson. Op cit., p. 147.
57. Moriarity, John H., ch. "Subcommittee to Study the Use of Punched Card Procedures in Libraries." (Report). ALA Bulletin 40: 101-2, Sept. 15, 1946.
58. Film 'n File, Inc. Filmsort. New York, The Co., n. d.
59. Ibid.; also Film 'n File, Inc. Filmsort, the Individual Filing System for Microfilm. New York, c1950.
60. Film 'n File, Inc. Filmsort. New York, c1950. (Direct quotation; quotes omitted to avoid confusion with marks designating "inches.")
61. These prices are as of May 10, 1950, and are F.O.B. factory. Information from Basil M. Parkinson, of Lee F. Kollie, Inc., Chicago distributors of "Filmsort."
62. Interview, June 23, 1950, with A. Robbins, of Film 'n File, Inc., New York City.
63. Letter, dated March 13, 1950, from David K. Maxfield.
64. Letter, dated Jan. 16, 1950, from Paul Vanderbilt,

Chief, Prints and Photographs Division. (Incidentally, Vanderbilt suggested that the writer "investigate the Marine Corps photograph files here in Washington. They have the most extensive application of key sort cards to the analysis of pictorial material which I have seen." (As indicated in Appendix I, however, the writer was unable to secure a response to his letter of inquiry.) The Marine Corps files are presumably, but not necessarily, on microfilm-insert cards.)

65. Interview, June 23, 1950, with Patricia R. Sherman, of the McBee Co. (New York office).

66. Letter, dated April 30, 1949, from Evelyn Fritz.

67. Pacific Northwest Library Association. "Committee on Library Supplies and Equipment." (Report) PNLA Quarterly 14: 82, January 1950.

CONCLUSION

It has been shown that the marginal punched card system is adaptable to a wide variety of uses, and that it is relatively inexpensive. It may be very simple or very complex, and it may be more economical than the superseded system, or less so, depending upon the requirements of the particular situation and upon the ends to be achieved. If the librarian is chiefly interested in economy and simplicity, these goals can be met by designing the marginal punched card system in the light of such aims. If the librarian, not oblivious of the above desiderata, yet more conscious of the need to provide hitherto unavailable services, places a greater amount of emphasis on the relatively complex aspects of the marginal punched card system, these aims too can be realized.

No matter what kinds of devices the library uses to facilitate its operations, the efficiency and economy of such devices must necessarily be judged in accordance with the fundamental philosophy of the library and of the educational institution of which the library is a part. With the marginal punched card system as with any other setup, "cost" is always to be borne in mind, but monetary cost may be and very often should be secondary to more important considerations. If the objection of "cost" had been too seriously regarded "through the past history of libraries, we would still be doing without heat in the buildings, would be using the collections of books only in the daytime, and would limit the use to the favored few who could be served by a single faithful 'keeper' of books in each institution."(1)

Throughout this report the writer has tried to maintain the point of view that the marginal punched card system, wherever installed, should always be regarded as a means to an end—the end not of a narrowly-defined economy, but of optimum efficiency for the library staff and of optimum service to the library's clientele.

FOOTNOTE

1. Fair, Ethel M. "Inventions and Books—What of the Future?" Library Journal 61: 48, Jan. 15, 1936.

APPENDIX I

LIBRARIES USING MARGINAL PUNCHED CARDS(1)

College and University Libraries

American University, Washington, D. C.; Anne Jensen, Librarian.

University of Arizona, Tucson, Ariz.; Mrs. Lois Smith, Head, Circulation Department.

University of Arkansas, Fayetteville, Ark.; Marvin A. Miller, Director of Libraries.

Brown University, Providence, R. I.; David A. Jonah, Librarian; Helen Thompson, Acting Circulation Head.

Butler University, Indianapolis, Ind.; Harold L. Boisen, Librarian.

Cornell University, Ithaca, N. Y.; Wilfred Laurier Morin, Circulation Librarian.

University of Georgia, Athens, Ga.; Evelyn Fritz, Acting Director.

Harvard College, Cambridge, Mass.; K. D. Metcalf, Librarian; Robert H. Haynes, Assistant Librarian; Morrison C. Haviland, Assistant to the Librarian.
(See p. 114).

University of Illinois, Urbana, Ill.; George B. Brown, Acquisition Librarian; Wayne S. Yenawine, Circulation Librarian.

University of Illinois, Undergraduate Division, Galesburg, Ill.;(2) Louise Stubblefield, Reference-Circulation Librarian.

University of Illinois, Chicago Undergraduate Division, Navy Pier, Chicago, Ill.; David K. Maxfield, Librarian.

Indiana University, Bloomington, Ind.; N. S. Boardman, Circulation Librarian.

State University of Iowa, Iowa City, Iowa; Mrs. Luanna H. Stahlecker, Head, Reference and Circulation.

Johns Hopkins University, Baltimore, Md.; Homer Halvorson, Librarian,

University of New Hampshire, Durham, N. H.; Thelma Brackett, Librarian.

University of New Mexico, Albuquerque, N. M.; Helen

Hefling, Acting Librarian.
University of North Carolina, Chapel Hill, N. C.; George F. Bentley, Circulation Librarian.
Nova Scotia Technical College, Halifax, Nova Scotia, Canada; D. A. Redmond, Acting Librarian.(3)
Ohio Wesleyan University, Delaware, Ohio; (the writer served as director of this library from 1946 to June 1949).
Pennsylvania State College, State College, Pa.; Ralph W. McComb, Librarian; Wayne R. Campbell, Order Librarian; Evelyn Hensel, Assistant Librarian (Acquisitions and Cataloging).
Purdue University, Lafayette, Ind.; John H. Moriarity, Director of Libraries; Francis Wilson, Circulation Librarian.
Simmons College, Boston, Mass.; Margaret J. Arnold, Assistant Director of the Library.
University of Tennessee, Knoxville, Tenn.; A. L. McNeal, Chief, Readers' Services.
Texas College of Arts and Industries, Kingsville, Texas; Fred H. Graves, Librarian.
University of Toronto, Toronto 5, Canada; R. H. Blackburn, Assistant Librarian.
University of Tulsa, Tulsa, Okla.; Eugenia Maddox, Librarian.
University of Washington, Seattle, Wash.; Marguerite E. Putnam, Acquisitions Librarian.

Public Libraries(4)
Charlotte and Mecklenburg County, N. C.; Hoyt R. Galvin, Director.
Cleveland, Ohio; C. S. Metcalf, Director.
Fitchburg, Mass.; Ruth Hyatt, Librarian.
Gary, Ind.; Richard B. Sealock, Librarian.
Glendale, Calif.; Dorothy E. Getz, Acting Chief Librarian.
Hartford, Conn.; Magnus K. Kristoffersen, Librarian.
Mill Valley, Calif.; Virginia Robinson, Librarian.
New York, N. Y.; Edward G. Freehafer, Chief of the Personnel Office.
Porterville, Calif.; Dorothy D. Margo, Librarian.

Sacramento, Calif.; Mrs. Grace Taylor Dean, Librarian.
San Bernardino, Calif.; Mary Belle Kellogg, Librarian.

Special Libraries
Army Medical Library, Washington, D. C.; Estelle Brodman, Chief, Reference Division.
The International Nickel Company, Inc., New York, N. Y.;(5) V. B. Seidel, Librarian.
Mayo Clinic, Rochester, Minn.; Thomas E. Keys, Librarian.

For the sake of completeness, the few libraries from which the writer was unable to secure responses are listed below. These institutions have been reported to be using marginal punched cards.

Public Libraries
Hayward, Calif.

Special Libraries
Marine Corps Photographic Files, Arlington, Va.
City and County of San Francisco, San Francisco, Calif.
U. S. Department of State, Division of Library and Reference Services, Washington, D. C.

FOOTNOTES

1. The name and position of the writer's correspondent is indicated in each case.
2. This division was closed in June, 1949. (Interview with Louise Stubblefield, Feb. 10, 1950).
3. This institution, and the University of Toronto, listed below, are the only institutions outside the United States with which the writer has had correspondence.
4. The writer tried to reach every library in the United States known to be using marginal punched cards. (The names of most of such users were furnished through the companies which supply them with cards; others were made known to the writer by correspondents and as a result of announcements appearing in the Library Journal and College and Research Libraries.) Contact was made with public and special libraries in order to ascertain whether

any of the schemes which they are using might be adaptable to college and university library practice.

5. A letter dated March 9, 1950, from Seidel to the writer states as follows: "Although we are still using the cards, we are not using the system for which they were designed. Our library is too small to gain any advantage from their use."

APPENDIX II

SPECIAL EQUIPMENT AND SUPPLIES(1)

Guide Cards

Guide cards may be ordered in a number of the standard sizes. They correspond in dimensions to those of the cards with which they are to be used, except that a visible-index tab is attached at the top. Strips of inserts come with each order of guide cards, so that whatever headings are desired may be typed onto the inserts. Since the guide cards are perforated to match the holes in the file cards, the obvious advantage in using them is that, while they serve their primary purpose as guides, they may also be sorted along with the file cards, maintaining the sectional divisions of the file for easy reference.

One of the disadvantages of the guide cards is that their rigidity, required by their function as guides, lends to the difficulty of properly "fanning" a bunch of file cards in which one or more guide cards are present. In addition to the above disadvantage, the guide cards are expensive ($18.15 per hundred for the 3 1/4 x 5-inch size). The writer does not recall any reference to these guide cards in the literature on marginal punched cards, nor has any library with which he has corresponded, mentioned their use. The writer's own experience with the cards would lead him to the position of not recommending their purchase.

The Selective Sorter

The "Keysort" selector is a device for holding two or more needles while they are being used simultaneously to select one or more classifications from a group of marginal punched cards. The cards are placed in a chase in such a position that they face away from the operator (Plate XII). As many needles as may be necessary are inserted through the appropriate holes (whether inner or outer row or both) and the chase inverted on its pivots.

An adjustable tray is placed in position to catch the cards which drop out. (The latter cards, of course, may simply be offset for easy reference, as shown in Plate XIII, and then pushed back into position, so that the arrangement of the file is not disturbed.) When the chase is re-inverted, the selector head, containing the needles, is drawn back to release the first group of cards and to prepare the selector for the reception of the next group.

When not in use, the selector may be instantly collapsed for convenient storage. Setting it up, likewise, takes only a second. It can accommodate a card up to 10 1/2 inches in length and has the capacity for efficiently handling about 200 cards at a time. The price of the selector—a price which will seem high to many librarians—is $112.00.

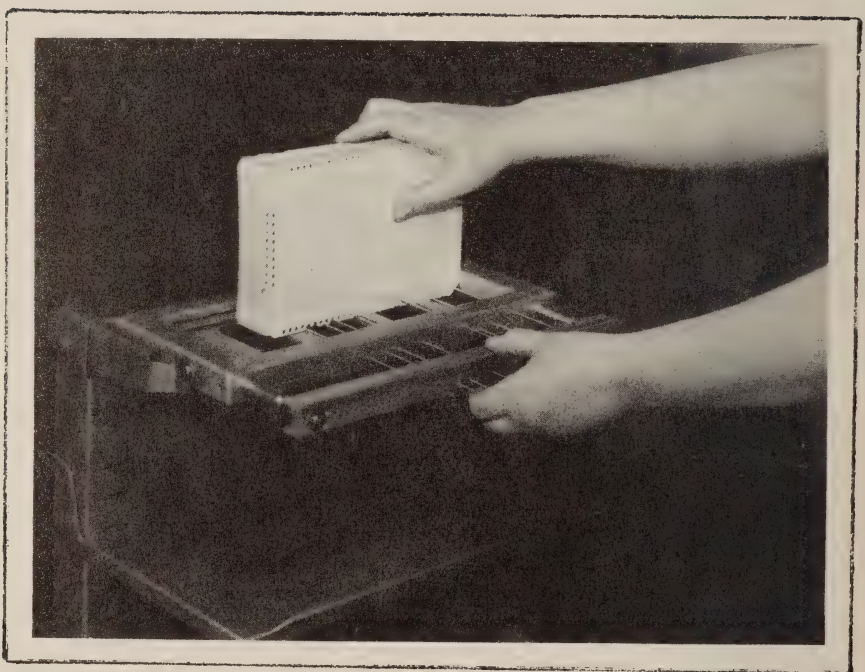
The selector described above was put on the market just about two years ago and is being used by only a few libraries. Only one of the writer's correspondents—the one at the University of Georgia—has referred to the use of a selective sorter of any kind, whether of the above type or of a less expensive type, to be described below. The new "Keysort" selector was purchased by Ohio Wesleyan University Library,(2) but in the absence of information about the less expensive model.

The McBee Company formerly sold a very simple selector, consisting of a handle attached to a framework for holding multiple needles. Fortunately, for those who want an inexpensive selector, the simple type is still available, for approximately ten dollars, from the Charles R. Hadley Company.(3)

Multi-Needle Arrangement without a Selector Frame

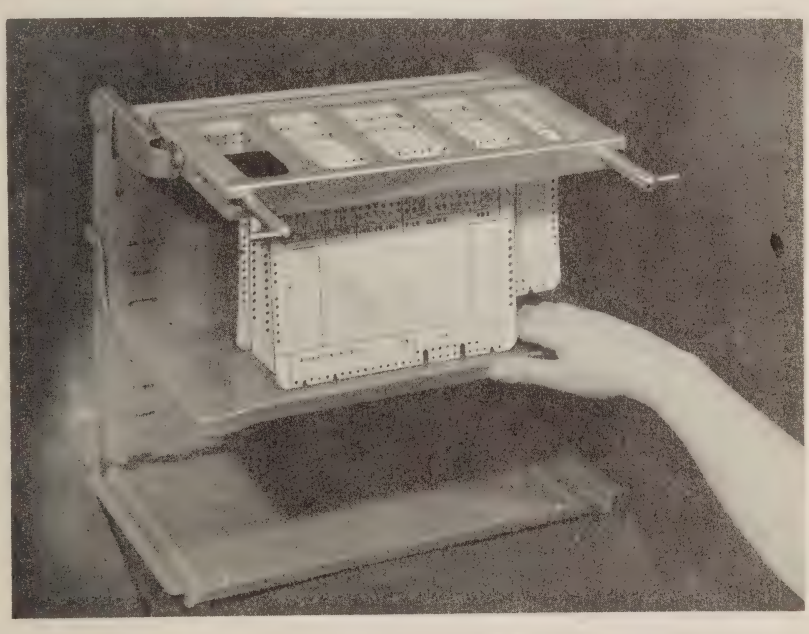
P. F Cooper, of the McBee Company's New York office, has suggested a selective-sorting technique which may be employed without the use of a selector frame.(4) The conventional tumbler is inserted near the middle of the group of holes that is to be pierced, and a bunch of loose needles, as many as are necessary, are inserted in the remaining holes. Lifting the tumbler will then release the wanted cards. Cox, Casey, and Bailey found that two unnotched

PLATE XII. The Selector, with Chase in Upright Position



(Courtesy The McBee Co.)

PLATE XIII. The Selector, with Chase in Inverted Position



(Courtesy The McBee Co.)

cards, one at the front and the other at the back of the pack of cards from which the selection was to be made, were helpful in keeping the loose needles in place.(5)

The American Foundrymen's Society, Ames and Kujawski, Westbrook and DeWald, and others have reported the use of the above or a similar method, none of them indicating any special disadvantage to its employment.(6)

Cox, Casey, and Bailey recommend No. 1, 10-inch knitting needles for supplementing the work of the tumbler in the selective-sorting process. Ames and Kujawski use "ten-inch straight lengths of 0.092 inch diameter spring steel wire . . . sharpened to a blunt point on one end," and to which, at the other end, a metal button has been soldered.(7) (cf. Young's recommendation, p. 25.)

The Key Punch

The key punch, which resembles an adding machine, is available in two models: one, electric, for use with a large volume of cards; and the other, of the manual type, identical with the electric model, in appearance, except that it is equipped with a hand lever instead of a motor bar (Plate XIV). These machines will accommodate cards up to 8 1/2 inches in length. The keyboard consists of a series of keys numbered 7-4-2-1 to correspond with the conventional sequence-coding arrangement which is found on most of the cards with which such machines are used. The depressing of an extra key will lock the notching pattern of the main keyboard so that any particular combinations may be repeated indefinitely.

A trained operator can notch each side of a card almost as fast as she can turn the card. The writer watched one operator as she notched, with an electric key punch, all four sides of a 3 1/4 x 7 1/2-inch card at the rate of about 600 cards per hour.(8)

To the writer's knowledge, no libraries are using a key punch. Where there is any possibility, however, of a library's adding this equipment,(9) the code to be used on the card will have to be taken into account. For instance,

PLATE XIV. Key-Punch Machines: Electric and Manual

(Courtesy The McBee Co.)

where two letters of a proper name or of a subject are to be coded by the NZ-7-4-2-1, NZ-7-4-2-1 combination, the arrangement as just given will be satisfactory for hand slotting, but not for key-punching. For key-punching, the arrangement would need to be as follows: 2 - 1 , 7-4-2-1, 7-4-2-1.(10) NZ NZ

The Grooving Machine

The groover, or gang punch, consists of a cabinet-mounted notch-shaped blade attached to a treadle (Plate XV). With the use of this instrument, requiring foot-power only, as many as 200 cards can be notched in one operation. The McBee Company indicates that ". . . an experienced operator can punch 200 cards on a five-digit classification in less than 10 seconds."(11)

Aside from Kilgour's reporting that the Harvard College Library rented one of these machines from the McBee Company for $4.00 per month,(12) no reference has come to the writer's attention, either in the literature or in his correspondence, indicating the use of such equipment by a library. At Harvard an assistant would use the machine about once an hour in connection with the circulation department's marginal punched date-due records.(13)

Where it is known in advance that a thousand or more cards will be notched in the same position (for instance, the cards representing books on reserve), the manufacturer will groove such cards for the library.

One limitation of the groover is that it can be used for outer-row notching only.

The Card Counter

The card counter performs the function which its name implies. (Besides the electric key punch, this is the only electric equipment manufactured by the McBee Company.) Through a system of belts and rollers "cards of all commercial sizes" can be counted at a rate of up to 40,000 per hour, depending on the width of the card. The visible-dial type counters record up to the figure 99,999.(14)

As is true with respect to the key punch and the grooving

PLATE XV. The Grooving Machine

(Courtesy The McBee Co.)

machine, no library, to the writer's knowledge, possesses or makes use of one of these electric counters.

When the number of marginal punched cards is so large that hand-method counting begins to require an excessive amount of time, the cards may be measured, figuring about 110 cards (of the 25 per cent rag-content type) to the inch. This device, while not as accurate, of course, as actual counting, will be sufficiently satisfactory for practical purposes.

File Cabinets

The McBee Company also manufactures file cabinets which may be used with its cards. These are 52 inches high, built in 2-drawer widths, and contain drawers which are 15 inches deep. The drawers, which may also be used as trays, accommodate cards up to 6 1/2 inches in width and 8 inches in length. (15)

Lists of Alphabetical Sub-Divisions

If a library expects to use numerical sequence codes, it may want to obtain from the McBee Company one or more lists of alphabetical sub-divisions. These lists range from a 100-division alphabetical breakdown to one of 10,000 divisions. The 100-, 250-, 500-, and 1000-division lists (perhaps others) are available from the company without charge. The 10,000 division breakdown is incorporated into a handy desk file in which 200 different alphabetical divisions (a hundred on the back of one card and a hundred on the front of the next) are visible at the flip of a finger. This piece of equipment, since it sells for about $75.00, most libraries will not be able to consider for purchase.

Other Alphabetical Codes

Since the coding of names and/or of subjects may be done in a number of different departments of the library, this may be an appropriate place to mention other alphabetical codes, in addition to the ones cited above and to the ones which have been referred to earlier in the book.

Cox, Casey, and Bailey provide an equal-alphabetical-interval code for use with the sequence 0 to 99.(16)

A 10,000-division code for proper names (referred to on pp. 109-10 in connection with student registration procedure) appears in G. W. Baehne's Practical Applications of the Punched Card Method in Colleges.(17)

The IBM Company's Manual of Modern Coding Methods(18) contains helpful information on the setting up of numerical codes for use with alphabetical lists. (Some of the pointers in other parts of the booklet may also be useful to the librarian working with marginal punched cards.)

Peakes calls attention to the inconvenience of having to refer to the code every time a name is numerically coded or decoded. He recommends, instead, the separate coding of each of the first few letters of the person's name, ". . . since it has been found in typical name lists that the first four or five letters will make a nearly complete separation."(19)

Westbrook and DeWald use a 12-position section for coding the first three letters of an author's name.(20) To each hole is assigned two letters of the alphabet, in sequence: AB to the first, CD to the second, and so on (OPQ and XYZ are used as triplets in order to save a hole). Each of the first three letters of the author's name is then notched just as if each letter of the alphabet had been assigned to a separate hole. In other words the initial letter of both "Anderson" and "Brown" would be notched at the "AB" position. This system, while offering some advantages, suffers from the handicap which is typical of all superimposed coding methods—unwanted cards may fall with any particular group of wanted ones.

FOOTNOTES

1. For a description of the equipment and supplies to be found in the typical installation, the reader should refer to Chapter II.

2. The price cited in connection with the selector, and also the one cited in connection with the guide cards, represent prices paid by the Ohio Wesleyan Library for these two items in 1948.

3. Interview, Feb. 28, 1950, with Carl P. Keckley, of the Hadley Co. (New York office).

4. Reported in Cox, Gerald J., Robert S. Casey, and C. F. Bailey. "Recent Developments in Keysort Cards." Journal of Chemical Education 24: 67, February 1947.

5. Cox, Casey, and Bailey. Loc. cit.

6. "(American Foundrymen's Society) Uses Punch Card System to Index Foundry Literature." American Foundryman 14: 35, October 1948; Ames, Stanley R., and Wilma F. Kujawski. "Use of Punched Cards for Indexing and Classifying Biochemical Literature." Special Libraries 39: 237-38, September 1948; Westbrook, J. H., and L. H. DeWald. "A Modified Punch Card Filing System for Metallurgical Literature." Metal Progress 54: 327, September 1948.

7. Cox, Casey, and Bailey. Loc. cit.; Ames and Kujawski. Op. cit., p. 237.

8. The American Book Co., New York; visit, Feb. 15, 1950.

9. The electric model rents for $10 per month; the manual model for $5.00. These rental rates and the ones given on the following pages are as of April 11, 1950. Information from Patricia R. Sherman, of the McBee Co. (New York office.).

10. The Charles R. Hadley Co. Sorting Alphabetically and Numerically with Rocket. Los Angeles, The Co., n. d.

11. The McBee Co. McBee Keysort. Athens, Ohio, The Co., c1943.

12. Kilgour, Frederick G. "A New Punched Card for Circulation Records" Library Journal 64: 132, Feb. 15, 1939. (The rental rate is still $4.00 per month.)

13. Kilgour. Loc. cit.

14. The McBee Co. McBee Keysort. Op. cit. The rental rate on this machine is $25.00 per month.

15. The McBee Co. McBee Keysort. Op. cit.; and information from Patricia R. Sherman, of the McBee Co., New York office, April 11, 1950.

16. Cox, Casey, and Bailey. Op. cit., p. 70.

17. New York, Columbia University Press, 1935, pp. 67-90.

18. International Business Machines Corporation. A Manual of Modern Coding Methods. New York, The Corp., n. d., pp. 15-18. (The booklet is available, without charge, from the IBM Co., 590 Madison Ave., New York 22, N. Y.)

19. Peakes, Gilbert L. "Report Indexing by Punched Cards." Journal of Chemical Education 26: 143, March 1949.

20. Westbrook and DeWald. Op. cit., pp. 326, 327.

APPENDIX III

MARGINAL PUNCHED CARD SYSTEMS WHICH DIFFER FROM "KEYSORT"

"Rocket"

The "Rocket" marginal punched card is manufactured by the Systems Service Department of the Charles R. Hadley Company, with headquarters at 330 North Los Angeles Street, Los Angeles 12, California (and with offices in other principal cities.)(1)

Since there has been a close relationship between the "Rocket" and the "Keysort" systems, it may be well to quote part of a paragraph written by Dan Merrick, Executive Assistant of the McBee Company, in answer to an inquiry from the writer:

> The Charles R. Hadley Company operated for several years as a licensee under our patents and agreements. A major portion of their activity was in several western states where we at that time had no representation. After the close of the recent war our expansion program led to the establishment of our own sales offices in the far west so the previous working arrangement was terminated. . . .(2)

In addition to marginal punched cards, the Hadley Company manufactures a tumbler, a slotter, a groover, and a filing cabinet for use with these cards. (The selector, made available through this company, is described on p. 179).

The slotter is advertised as being capable of notching up to six cards at one time.(3)

The groover resembles the "Keysort" machine and is represented as having the same capacity. The filing cabinet, likewise, seems to be similar to the McBee cabinet.(4)

The prices of the slotter and tumbler are $3.50 and $1.50, respectively, and "the estimated cost of (the cards), . . . varying according to the card stock used, will range from $6.00 to $8.00 a thousand in 10,000 lots and $9.00 to $12.00

a thousand in 1,000 lots."(5)

The Hadley Company, like the McBee Company, makes available a number of stock cards. The two which correspond to the "Keysort" cards, described on pages 37-38, are Forms Y12 (3 1/4 x 7 1/2 inches) and Y9 (5 x 8 inches). The prices of these cards are as given below.(6) (As is indicated, the cards are available in quantities as small as 100.)

	Y12	Y9
Per 100	$ 1.95	$ 2.55
" 250	4.15	5.50
" 500	6.95	9.15
" 1000	12.50	16.50
5000 (per 1000)	10.00	13.20

The Hadley Company's "Standard Library Analysis Form Y16" has already been referred to (pp. 32, 154, etc.). This card is a stock form selling for $9.00 per thousand.(7)

"Cope-Chat"

"Cope-Chat" marginal punched cards are manufactured by Messrs. Copeland and Chatterson, Exchange House, Old Change, London, E. C. 4.(8) Referred to also as "Paramount" or "Cope-Chat Paramount," the trade name is one used in England for the type of card known as "Keysort" and "Rocket" in the United States.(9)

The English card appears to be identical with the American except that the holes are arranged just a bit closer together—enough to permit the inclusion of an extra hole in every four inches of margin.

"X-ray"

"X-ray" is the trade name used by the Le Febure Corporation, of 617 Oakland Road, N. E., Cedar Rapids, Iowa. Its card, which seems to be identical with "Keysort" except for closer spacing of the holes (five to the inch instead of four), also bears the trademark, "Speed Sort Systems,

Worlds Fastest Sorting, San Francisco, Calif." The Le Febure tumbler and slotter also bear the "Speed Sort" label.

A letter of inquiry addressed to the Le Febure Corporation failed to bring a reply, and a check-up on "Speed Sort" was unfruitful.(10) To the writer's knowledge, the literature on marginal punched cards makes no reference to either "X-ray" or "Speed Sort."

"E-Z Sort"

The "E-Z Sort" marginal punched card is manufactured by E-Z Sort Systems, Ltd., of 45 Second Street, San Francisco, California. The card differs from "Keysort" in two respects. In the first place, the holes are staggered in their arrangement along the margin of the card (see Plate XVI). This staggered arrangement provides a sufficiently strong card edge to make possible the inclusion of six holes to the inch—the latter provision constituting the second of the differences between "E-Z Sort" and "Keysort" cards.

The E-Z Sort Systems manufactures a tumbler, hand punch, electric punch, sorting tray, groover, and selector, for use with its cards.

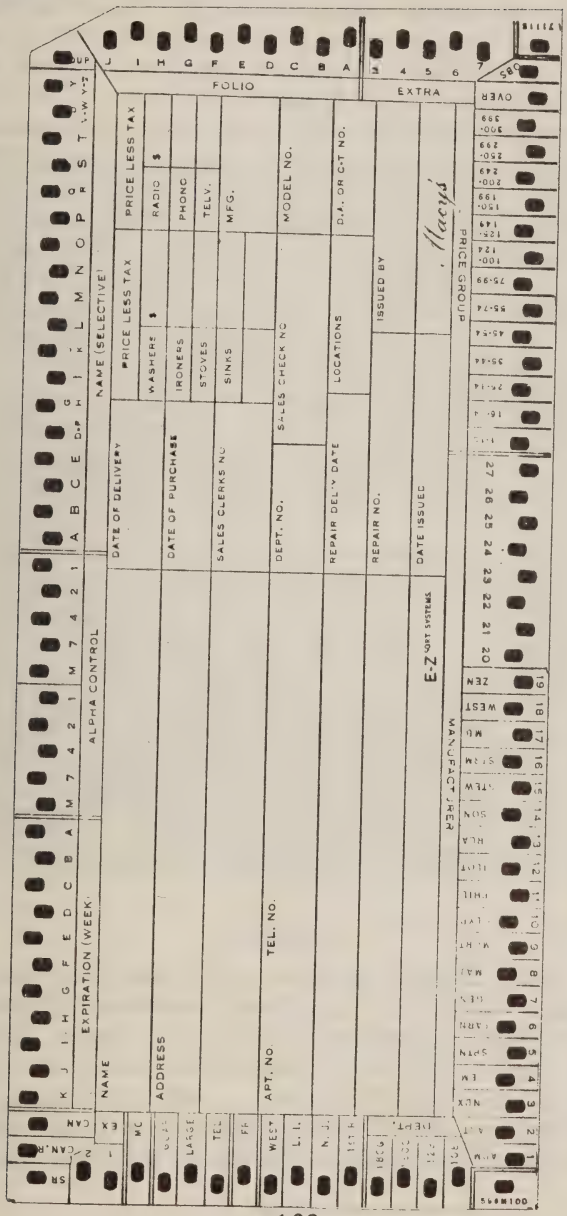
The tumbler appears to be of a simpler, less expensive type than the one manufactured by the McBee Company. It is not adjustable in length—a limitation which may be of not too much importance.

The hand slotter, which has a replaceable blade, "punches up to 10 cards per operation with little effort."(11) A uniform depth of punch is required for both inner and outer rows of the staggered holes.

The "E-Z Sort" sorting tray, corresponding to the "Keysort" alignment block, is made of metal and is closed on three sides, being open at the operator's left. The tray is mounted on a wooden block. Another style, with a different type of base, is shown in Plate XVII, page 195.

The electric punch includes only six keys, as contrasted with the thirty-five on McBee's key punch. This difference would presumably make it impossible for the "E-Z Sort"

PLATE XVI. An "E-Z Sort" Card



machine to repeat, by use of a repeat key, a given pattern of notches. By way of compensating for this disadvantage, the "E-Z Sort" machine permits "full visibility of media and punching" (in the "Keysort" machine the card edge which is being punched is hidden from view). The manufacturer claims that up to six cards can be notched at the same time, and that the machine can handle up to 800 cards per hour.(12)

The "E-Z Sort" groover seems to be of the same type as the corresponding "Keysort" equipment, but is not enclosed in a cabinet, and has a capacity of only 150 cards in one operation—50 cards less than the capacity of the McBee machine. On the "E-Z Sort" equipment, "punch spacing is mechanically controlled."(13)

The "Multi-Sort Controller" (Plate XVII), manufactured for use with the company's cards, weighs less than a pound, yet is ". . . so sturdily built that an entire edge of from 300 to 500 cards can be easily handled, or sorted, in a single operation."(14)

The E-Z Sort Systems manufactures no stock cards, as do McBee and Hadley. "Every installation is 'tailor-made.'"(15)

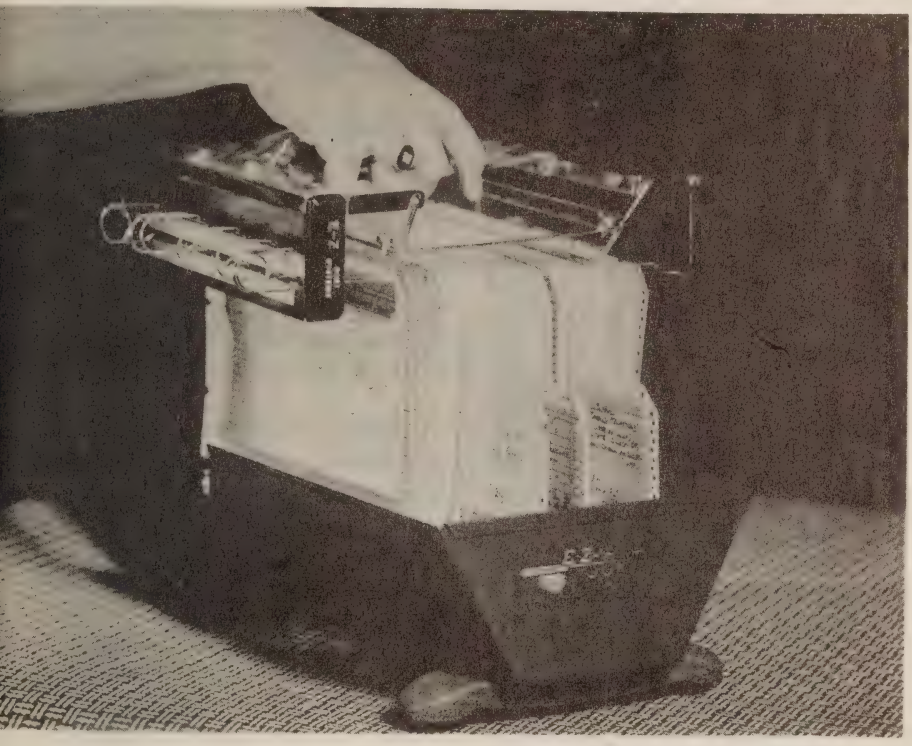
The prices (or rentals) of "E-Z Sort" equipment are as follows: Sorting trays ("in two styles and various sizes"), from $7.50 to $11.50 each; Hand punch ("with extra replaceable blade"), $15.00; Electric groover, $15.00 per month; Foot groover, $10.00 per month; Electric key punch, $15.00 per month; Electric "automatic" key punch, $22.50 per month.(16) The tumblers sell for $12.00 per dozen and the "Multisorter" costs $35.00.(17)

"Velom"

The "Velom Sorter" is used with a marginal punched card system which ". . . has been introduced to the industry by Brevetti Lombardini S. R. L., Via Carlo, Forianini, 9 Torino, Italy."(18) It is claimed that the system can handle "more than 2,000 cards . . . simultaneously."(19)

An illustration of the sorter is provided in the cited article, but the picture does not make at all clear the method

PLATE XVII. The E-Z Sort "Multisorter"



(Courtesy E-Z Sort Systems, Ltd.)

of operation. The writer has not received an answer to a letter of inquiry addressed to the Italian firm.

"Zatocoding"

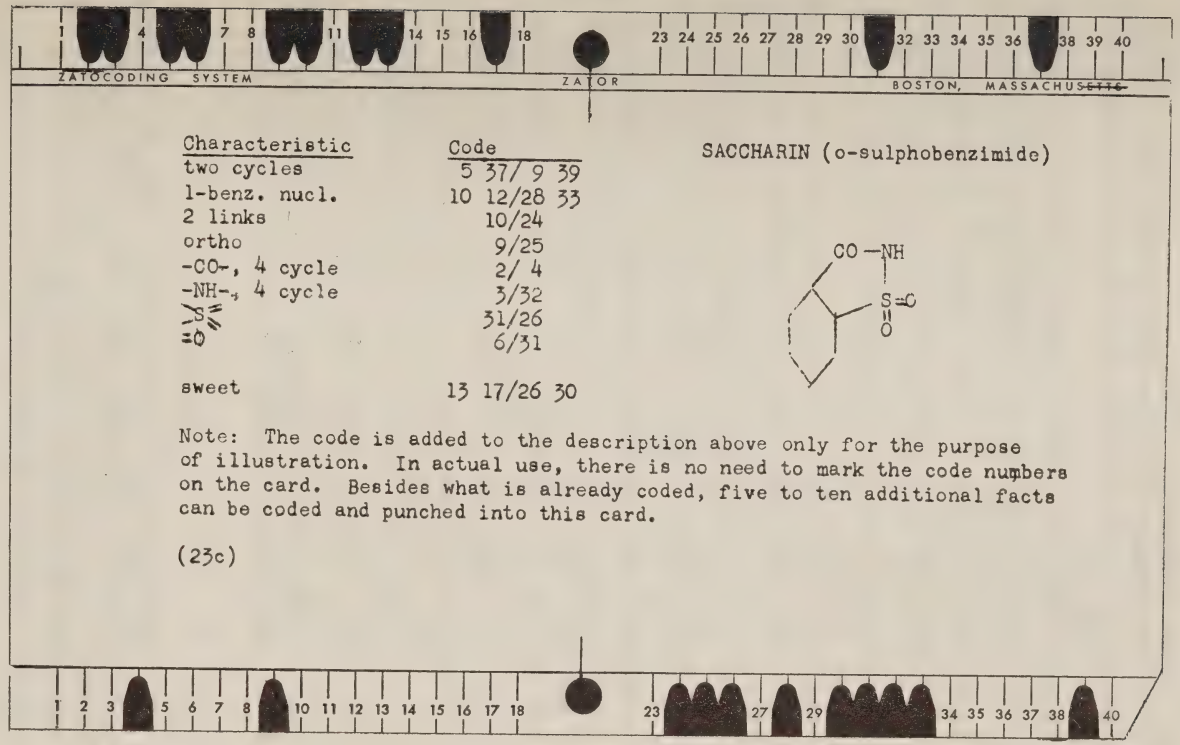
"Zatocoding" equipment is manufactured by the Zator Company, of 79 Milk Street, Boston 9, Massachusetts. Although it is a marginal punched card system, it differs radically from the type of system with which we have been principally concerned.

Of the two types of cards used (both are 5 x 8 inches in size), one has a single hole, a quarter of an inch in diameter, at the bottom center, just like a library catalog card. The other type of card has, in addition to this hole, one on the opposite side, of the same size and in a corresponding position (see Plate XVIII). Except for these holes, the cards are unperforated. On the single-hole card there appear forty lines or positions, combinations of which are notched out, with a hand punch, according to codes selected on a random-number basis.

A bunch of cards, in inverted order, is placed in a special sorting box, and needles are inserted through the bottom of the box to correspond with the positions which have been notched on the cards that are to be selected. An electric vibrator then jiggles the cards so that all those which have the appropriate notches fall the three-eighths-inch length of the notch. The bottom edge of all the selected cards is now in a position just below the large center hole of the remaining cards. A needle ("the handling tool") is inserted through this hole, and then lifted; the unwanted cards are pulled away, leaving the selected cards in the sorting box.

The second type of card used by the Zator Company provides for seventy-two positions, thirty-six on each of the two 8-inch sides. (On these cards four positions are skipped on each side in order to accommodate the center holes.) The selecting process is identical with that used for selecting 40-position cards except that both sides of the card need to be processed.

The system is designed neither for direct coding (i. e.,



Characteristic	Code
two cycles	5 37/ 9 39
1-benz. nucl.	10 12/28 33
2 links	10/24
ortho	9/25
-CO-, 4 cycle	2/ 4
-NH-, 4 cycle	3/32
>S=O	31/26
=O	6/31
sweet	13 17/26 30

SACCHARIN (o-sulphobenzimide)

Note: The code is added to the description above only for the purpose of illustration. In actual use, there is no need to mark the code numbers on the card. Besides what is already coded, five to ten additional facts can be coded and punched into this card.

(23c)

the assignment of but one hole to a particular classification) nor for sequence sorting.

For other details, including illustrations of the sorting box, etc., the reader is referred to the Library Journal of May 15, 1948.(20)

Although Calvin N. Mooers, the originator of the system, has indicated, in response to an inquiry from the writer, that "there are no library uses (referring to installations) of Zatocoding,"(21) the article cited above mentions the possible use of the system by special libraries. It follows that the libraries of some of the university's special departments might likewise be interested in exploring the advantages of this new technique.

Since "Zatocoding was specifically developed for the one main problem of searching for and finding recorded information according to subject specification," and since "the emphasis, according to Zator Company policy, is placed upon systems and techniques that are directed towards the goal of service to the scientist and engineer,"(22) it will be only the reference librarian (and only the reference librarian in special fields of knowledge) who will be primarily concerned with this particular system.

The fact that a Zatocoding service agreement requires "initial and continuing technical assistance," sometimes demanding "considerable engineering time," would make the installation too expensive for many university departments. While the Zatocards (of either type) are only $10.00 per thousand, and the card trays and hand punch $7.50 and $5.00 each, respectively,(23) the leasing of the patented Zator Selector and the made-to-order random-numbers coding, involves an expenditure comparable to the cost of using IBM or Remington Rand equipment.(24)

"Findex"

"The Findex System" is the product of Wm. K. Walthers Inc., of 241 East Erie Street, Milwaukee 2, Wisconsin. "Findex" is not a marginal punched card system, but since it uses punched cards (see Plate XIX), and since these cards are handled by manual rather than by machine

PLATE XIX. A "Findex" Card

NAME

PRESENT ADDRESS

HOME ADDRESS

DEGREES

PRESENT POSITION

AGE

SALARY ACCEPTABLE

SUBJECTS

TEL. NO.

TEL. NO.

POSITION DESIRED

EXPERIENCE

SALARY

CHURCH

LOCATION

English

Language

Mathematics Psychology Bible

1 Education
All · Speech · Journalism · French · Spanish · German · Latin · Greek · Italian · All

Teacher Training · Junior College · Senior College · Dean or Girls Adviser · **Social Science** · Ancient History · Med. & Mod. Hist. · U. S. History · Political Science · Econ. · Sociology · Geography

2 Natural Science
Agriculture · Botany · Chemistry · General Science · Physics · Physiology · Zoology · Geology · Bacteriology · All · Drawing

3 Commercial
All · Book-keeping · Stenography · Other Commercial · **Home Economics** · Clothing · Foods · Vocational · Paintings · Handwork · Male · Female

4 Music
All · Ensemble · Theory · Piano · Violin · Public School Music · Vocal · All · Football · Basketball · Track · Physical Education

5 Activities
Girl Reserve · Hi-Y · Boy Scout · Dramatics · Debating · Library · Catholic · Protestant · Others · Baptist · Methodist · Christian

6 Position
H. S. Teacher · Jr. H. S. Teacher · Supt. · H. S. Principal · Jr. H. S. Principal · College · Supervisor · Tests & Measurements · Elem. Prin. · Kindergarten · Primary · Other Grades

7 Training
A. B. · B. S. · A. M. · Ph. D. · 60 Hr. · 0 · 1 Yr. · 2 Yrs. · 3-5 Yrs. · 6 Yrs. or More

8 Salary
Below 1000 · 1000 1199 · 1200 1349 · 1350 1499 · 1500 1799 · 1800 2099 · Over 2100

9 Location
Not Specified · Mo. · Middle West · West · South

10

Findex

Patented Milwaukee Form 436

Committee on Recommendations
UNIVERSITY OF MISSOURI
Columbia, Missouri

methods, a few comments may be in order, if for no other reason than to distinguish the system from the marginal punched card system.

"Findex" uses four sizes of cards: 4 x 6, 6 x 6, 6 x 8, and 8 x 8 inches,(25) of which the two latter sizes are most common. The slotting away, with a special slotting punch, of the card stock separating two holes in vertical relationship, forms the "position" to which a particular classification is assigned.

The cards are kept, along with others which have been slotted according to various classifications, in a drawer the front and back of which have been perforated over the entire center area, so that a needle may be passed through any hole of any card in the drawer. If a needle is inserted through a hole corresponding to the top of the slot which indicates a particular classification in a group of cards, and if the drawer is then inverted—when the drawer is pulled out from its place in the cabinet, a pivoting arrangement provides for the inversion—all the cards which have been slotted in the needled position will drop down a half inch. A couple of needles are then inserted just above the fallen cards and the drawer re-inverted. Now the selected cards protrude a half inch above the remaining cards, and may be consulted while in this position, or, with the removal of the selector needle, taken out of the file.

If several positions have been combined to denote a particular classification, or if it is desired to select several different classifications at once, as many needles are used as are required.

The "Findex" system is obviously not designed for sequence sorting; but as a selective mechanism, it operates, with its slots, about the same as the marginal punched card system operates with its notches (in fact, the "center-punch" technique, used with marginal punched cards, is identically the same as the "Findex" technique).

For further information, the reader is referred to a pamphlet which is available from the Findex Company; A Thousand Indexes in One ("Describing the Findex System, how it operates and how it provides for the control of facts through classification and selection of recorded

information").(26)

To the writer's question as to whether any library might be using the "Findex" system, Mr. Walthers furnished no answer.(27) No such installation is known to the writer, although he recalls having seen the system in use in a library school office, for the maintenance of personnel records.

Since "Findex" cards are more expensive than marginal punched cards (6 x 8-inch cards are $30.00 per thousand in lots of 10,000),(28) besides involving the use of special selection equipment, and since the system is not as fast as the marginal punched card system, its use by more than a few college and university libraries is not anticipated.

FOOTNOTES

1. Although the trade name, "Rocket," is used in connection with the Hadley cards, the company's principal trademark, "Pathfinder," is also found on some of them.
2. Letter dated March 1, 1950. (The "Rocket" card is being considered in this appendix simply as a matter of convenience. The material in Part I applies as well to "Rocket" as to "Keysort" cards.)
3. The Charles R. Hadley Co. Speed Your Routines with Rocket. Los Angeles, The Co., n. d.
4. Ibid.
5. Pacific Northwest Library Association. "Library Supplies and Equipment." (Committee report) PNLA Quarterly 14: 43, October 1949.
6. Quotation from the New York office, Feb. 15, 1950.
7. Pacific Northwest Library Association. "Committee on Library Supplies and Equipment." Loc. cit.
8. Clarke, S. H. "A Multiple-Entry Perforated-Card Key with Special Reference to the Identification of Hardwoods." The New Phytologist 37: 371, Oct. 1, 1938.
9. The ACS Punched Card Committee; an Interim Report." Chemical and Engineering News 27: 754, March 14, 1949.
10. The name does not appear among the "Leading Trade Names and Trade Marks" of the 1950 edition of Thomas' Register of American Manufacturers. New York, Thomas Publishing Co., c1949.
11. E-Z Sort Systems, Ltd. How About Your Controls? San Francisco, The Co., n. d.
12. E-Z Sort Systems, Ltd. How to Sort Punched Cards

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13. E-Z Sort Systems, Ltd. How About Your Controls? Op. cit.
14. E-Z Sort Systems, Ltd. "Operating Instructions (for the) E-Z Sort Systems Multi-Sort Controller." San Francisco, The Co., n. d.
15. E-Z Sort Systems, Ltd. How to Sort Punched Cards Automatically—without Machinery! Op. cit.
16. Letter, dated April 13, 1950, from Albert A. Rembold, of E-Z Sort Systems, Ltd.
17. Interview, April 19, 1950, with R. L. Hollingsworth, New York City representative of E-Z Sort Systems, Ltd.
18. "Italian Firm Introduces New Sorter." Office Appliances 89: 46, January 1949.
19. Ibid., p. 48.
20. "New Filing System Developed for Special Collections." Library Journal 73: 794-97.
21. Letter, dated Dec. 6, 1949.
22. Ibid.
23. Zator Co. "Zator Card Sorting Equipment—Specifications." (Zator Technical Bulletin No. 28) Boston, The Co., n. d. (Mimeographed.)
24. Letter, dated Dec. 23, 1949, from Calvin N. Mooers.
25. The Findex Co. A Thousand Indexes in One. Milwaukee, The Co., n. d., p. 18.
26. The Findex Co. Op cit. Descriptions of the system are also given in the following two references: "Demonstration of Punched-Card Apparatus." In Association of Special Libraries and Information Bureaux. 22nd Conf., London, 1947. Proceedings. London, The Association, 1947, pp. 56-57; "Mechanical Devices as an Economical Aid in the Administration of Public Libraries." Library World 42: 34, August-September 1939.
27. Letter, dated Jan. 5, 1950, from Wm. K. Walthers, president of the company (in response to the writer's letter of Jan. 2, 1950).
28. "Findex Price List," dated November, 1949.

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